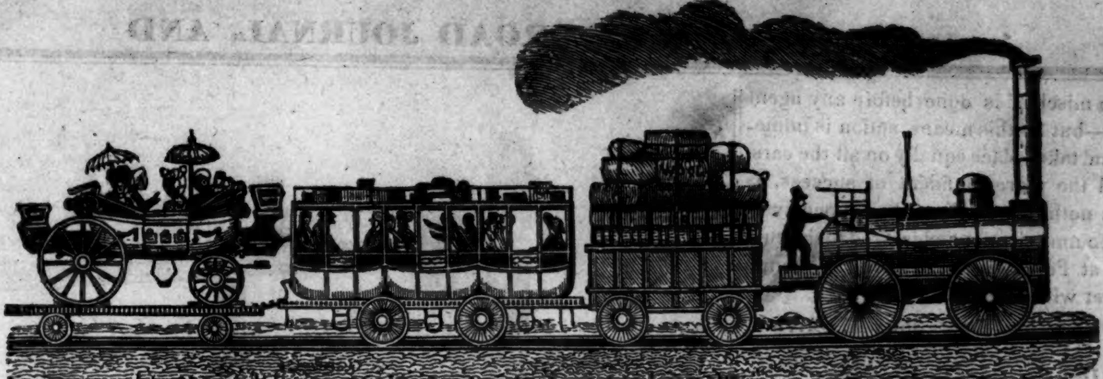

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, april 2, ~~MARCH 26~~, 1836. [VOLUME V.—No. 13.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 2, 1836.

TO ENGINEERS AND RAILROAD COMPANIES. —The Proprietor of the Railroad Journal proposes to act as Agent for ENGINEERS, and RAILROAD COMPANIES, in the purchase, or procuring of *Instruments, Books, Account Books, Stationery, &c.*

In the selection of *Instruments* the aid and advice of practical Engineers will always be had. In the furnishing of Blank Books for the Company's use, they will be made to *order*, or to correspond with those in use in this city, if no special order is given, and of the best materials and workmanship. Articles of Stationery of the best quality will be furnished at fair prices—and cash or city acceptances expected on forwarding the articles.

Immediate attention will be given to orders received and the articles furnished at the earliest possible period.

D. K. MINOR.

New-York, April 16, 1836.

EDITORS and PUBLISHERS of Newspapers are respectfully requested to take notice and bear in mind that I propose to act as AGENT to procure and forward promptly, *Printing Machines, Printing Presses, Types* and *Fixtures* of every description, necessary to furnish a Printing Office complete.

Also to purchase and forward *Paper, Ink*, and other materials used in the line.

Also to COLLECT ACCOUNTS due in the CITY and STATE OF YEW-NORK and in the State of *New-Jersey, Pensylvania*, and *all* the *New-England States.*

My heavy losses by the late conflagration render it necessary that I should redouble my diligence and exertion; and it has occurred to me that an AGENCY of this kind, conducted by an experienced and careful man, will be of much service to gentlemen at a distance who cannot conveniently visit the city to make the selections themselves. I therefore offer my services in *this line*, or to give any other orders in relation to other matters which may be desired by my friends out of the city.

My long acquaintance with the business, and with the manufacturers of the articles alluded to, and with the collection of *accounts* for Newspapers and Periodicals, will, I trust, enable me to execute orders entrusted to me, to the entire satisfaction of those who may feel disposed to patronize me in this new branch of business.

My commissions will in all cases be reasonable.

☞ No orders will be given for materials unless the payments, or paper offered, is satisfactory to the manufacturer.

D. K. MINOR.

GEORGIA RAILROAD AND BANKING COMPANY.—The Southern Banner states, that, "at a meeting of the Board of Directors of the Georgia Railroad aud Banking Company, held in Athens, on Saturday, the 26th ult., William Dearing, Esq., was chosen President, James Camak, Esq. Cashier, and Wm. R. Cunningham, Esq. Book Keeper. Hon. A. S. Clayton, and Jacob Phinizy, Esq. were also elected Directors, in place of Messrs. Camak and Cunningham, resigned. We learn that much unanimity prevailed, and the measures were adopted to hasten the construction of the Road. The Bank is expected to be in operation in a few weeks."

J. K. SMITH'S SELF-ACTING BRAKES FOR RAILROAD CARS.

"The subscriber has taken out Letters Patent for the principle of applping power to brakes by the motion or impetus and collision of cars on Railroads. Desirous of bringing the subject before the public, he has prepared drawings for the American Railrod Journal, explanatory of three modes in which the principle can be applied.

He is aware that the apparatus must vary according to the construction of the car, and leaves further explanation, believing that those interested will be able to make a suitable arrangement.

He flatters himself that he has, by this discovery, added something to the safety of Railroad travelling, to say nothing of the saving that will be made in attendance and the destruction of cars and machinery incident on Railroads. He hopes that this improvement will claim the attention of persons engaged on Railroads, inasmuch as every possible security, by means of brakes, is attained, and that instantaneously—without the aid of any attendant. Indeed, in many cases, accidents occur so unexpectedly,

that the mischief is done before any agent can act—but by this means, action is immediate, and takes place equally on all the cars.

I feel the more confident of success, as there is nothing complicated or expensive.

Any communications addressed to the subscriber at Port Clinton, Schuyl. Co., Penn., will meet with prompt attention.

JOHN K. SMITH.

Description of the Drawings.

Fig. 1 represents a part of the frame of a tender; and

Fig. 2 the ground frame of a coach with 4 wheels, 2 axles, 8 brakes, and 2 slides, *all inverted.* For the sake of distinction, I will call the large slide [*a*] the propelling slide, and the small one [*b*] the adjusting slide. Fig. 3 shows the side view of the two slides. In order that the adjusting slide can be more easily moved, when there is a long train, it can operate over rollers supported from the large slide.

The levers of the brakes meet in the grooves of the propelling slide. Through the end of the levers a pin passes, which is secured to the adjusting slide; there being a groove in the under part of the large slide, so as to admit of a motion of the pins of (say) 4 inches, carrying with them the levers of the brakes.

The propelling slide is coupled to the tender *without any play, but* the cars *must* play along the slide (say) 4 inches.

The adjusting slide, being immediately under the other, is coupled to the slide *c* on the tender, which is to have a shifting motion by means of lever *d.*

The whole drawing represents the slides properly attached, with the cars pressing forward on the slides, and the two front wheels locked, the cross lever *d* being secured to its place by an upright *hand* lever, *not* shown in the drawing. Now give the engine motion, and *both* slides will be drawn forward 4 inches, when the checks on the large slide will come in contact with the cross pieces of the cars, which move the cars; by this motion the brakes are thrown from the front wheels, and the other brakes thrown towards the hind wheels, *but not* against them, and consequently the whole train is ready for running. Now, in order that the engine can run her train back, all that is necessary *is to* relieve the hand lever on the tender, and give motion to the lever *d*, by which the adjusting slide is operated upon—carrying with it all the brakes on the cars; by this motion the brakes will be relieved from the *foremost* wheels, *during a retrograde motion,* and will not be thrown against the hindmost wheels, inasmuch as it would require the forward motion of the large slide to effect this; suffice it to say, that when the engine is to proceed, lever *d* must be secured by the hand lever in the position it is now in (as shown in the drawing), and when a retrograde motion is necessary, relieve it and give it a forward motion, which

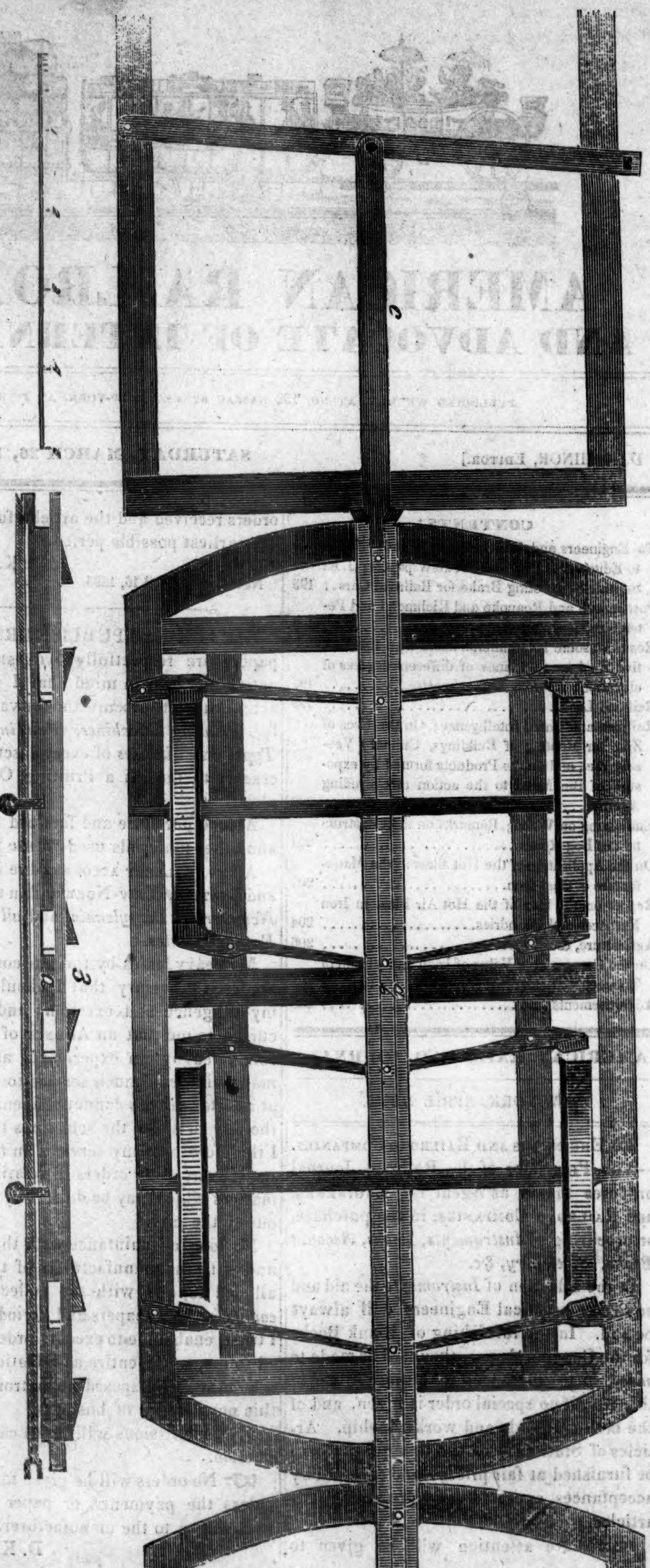


Fig. 1.

Fig. 2.

can be done by the engineer or his attendant, without the least inconvenience. I do not think it necessary to show that each car in the train would be operated on equally, and I believe it equally superfluous to enter into any explanation to show that precisely the same effects would be produced at either end of the train—*this will be the case*, and that without any alteration of the fixtures, save that of detaching the engine from one end of the train, and attaching it to the other; in like manner.

It must be borne in mind, that the cars are not attached to the tender in any other way than by the slides, except it be by a loose coupling; the cars must recede from, and approach the engines (say) 4 inches, while the propelling slide must remain firm in its place. The cars may be coupled to each other to prevent any one of them pressing forward on the brake, occasioned by any imperfection in the road or otherwise; *thus* it will appear that while the engine is exerting the least amount of power the brakes are free from the wheels. It will also be seen that when the engine is impeded, the brakes must take instantaneous effect, produced by the impetus of the cars—*and* that it is in the power of the engineer to relieve the wheels of the brakes.

In the accompanying drawing it will be seen that two wheels (the foremost) will be operated on by two brakes each, while the other two will remain free—on account of the long and short brakes, but if it should be thought best, one brake can be thrown against each wheel, by having them either all long or all short, and of *course* the pins andt he grooves in the propelling and adjusting slides must be made to suit.

Fig. 4 is a plan for a vertical brake, such as is used for the coal cars on the Little Schuylkill Railroad.

The cars are coupled with chains allowing them a play of about one foot. *a* is the brake; *b* the lever; and *c* the slide. In case of a stoppage, the cars run together, and drive in the slide which applies the brake to the wheels.

The inventor gives this as but one of the many modifications of his brake.

Fig. 5 represents a car and tender coupled loosely with a play of one foot, though this may be greater or less.

When the engine is impeded, the slide *a* on the front car will come in contact with *c* on the tender, and apply the brakes—the slides on the different cars will come in contact with each other, and so long as the press of the cars continues, the wheels will be locked. If it is necessary to free the wheels of the brakes, give motion to the lever *d* (as explained in Fig. 1). The spring of the levers will do much towards throwing the slide forward, and with the aid of a spring, or a weight operating over a pulley, the wheel will be relieved for a retrograde motion.

When the engine is changed to the opposite end of the train, the levers of the brakes

Fig. 4.

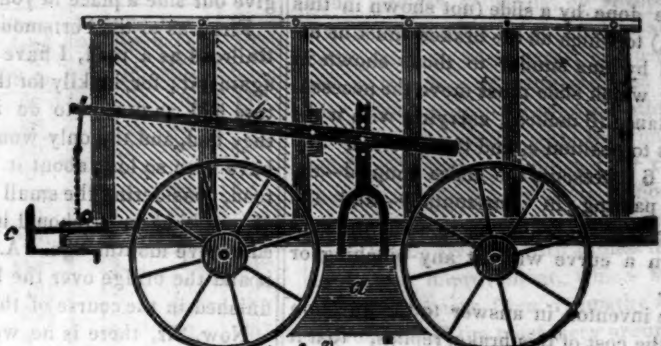


Fig. 5.

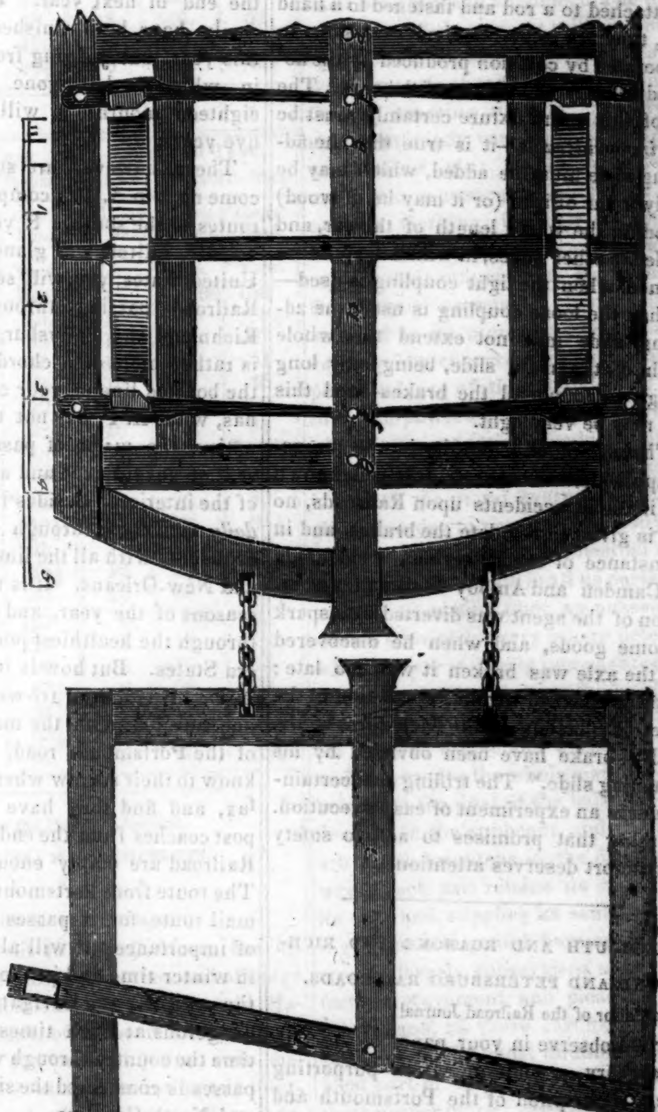
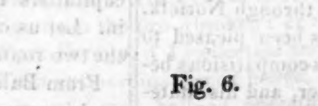


Fig. 6.



must be changed from *f* to *e*, which can best be done by a slide (not shown in this figure,) to which all the brakes must be attached by pins similar to those shown in fig. 2; which slide must move the necessary distance (6 inches), carrying with it the brakes to position *e*, and there bolted.

Fig. 6 represents the slides coupled—the bolts passing in horizontally—and the groove, &c. shaped so as to allow the cars to turn a curve without any pinching or strain.

The inventor, in answer to the question as to the cost of this brake, replies, "that it will be evident, from an inspection of the drawings, that there is nothing new in the brake itself, but merely in the application of the power. The brakes usually used are shown in the drawings, and in place of being attached to a rod and fastened to a hand lever, they are to be attached to a slide, to be operated by collision produced by the acquired velocity or impetus of the cars. The cost of this extra fixture certainly must be very *inconsiderable*—it is true that the adjusting slide must be added, which may be simply a bar of iron (or it may be of wood) extending the whole length of the car, and coupled to other slides, in which the pins are fastened when the tight coupling is used—or when the loose coupling is used, the adjusting slide may not extend the whole length of the main slide, being only long enough to couple all the brakes—and this slide may be very light.

[There is much ingenuity in the foregoing application of brakes. It is well known that in most accidents upon Railroads, no time is given to regulate the brakes, and in the instance of a very serious accident on the Camden and Amboy Railroad the attention of the agent was diverted by a spark on some goods, and when he discovered that the axle was broken it was too late; he had no time to regain his position at the brake. Objections to the early form of Mr. Smith's brake have been obviated by his "adjusting slide." The trifling cost certainly renders an experiment of easy execution. Any thing that promises to add to safety and comfort deserves attention.]

PORTSMOUTH AND ROANOKE AND RICHMOND AND PETERSBURG RAILROADS.

To the Editor of the Railroad Journal:

Sir,—I observe in your paper of the 27th of February, a communication purporting to be a description of the Portsmouth and Roanoke Railroad, which is in reality nothing but a *puff* of the merits of the line for travelling, that passes through Norfolk.

The writer, A. P., has been pleased to make some most invidious comparisions between this line and another, and his statements are calculated to deceive many of your readers who are not so well acquainted with the fact as we are in this neighborhood. As you have published his side of the question, it is no more than justice for you to give our side a place in your columns.

First, as to the Portsmouth and Roanoke Railroad as a road, I have nothing to say against it; for, luckily for the Company, nature had as much to do in making it as they had, and the only wonder is, that they have been so long about it. Sir, this Railroad, considering the small amount of work of any kind on it, should have been finished twelve months ago. A. P. tells you that it and the bridge over the Roanoke will be finished in the course of the summer.

Now, Sir, there is no way of disproving his statement, but if he is Virginian enough to back his assertion with a bet, I will bet him any odds that the bridge will not be finished this summer, or make him an even bet that it will not be finished by the end of next year. The bridge might easily have been finished by the end of this year, but judging from the slow way in which it has gone on for the last eighteen months, it will not be done in five years.

These, however, are small matters: we come now to A. P.'s comparison of the two routes to the south. If you, or your readers, Mr. Editor, will glance at a map of the United States, you will see that the line of Railroad passing through Washington, Richmond and Petersburg to the Roanoke, is rather more of a chord of a circle than the boasted line of your correspondent, and has, what A. P. has not thought proper to notice, the merit of passing through the seat of government and all the large towns of the interior. Besides this, it is the great *daily mail* route through the Union, and is connected with all the lines between Boston and New-Orleans. It is a line open at all seasons of the year, and passes generally through the healthiest portion of the Southern States. But how is it with the route of A. P? It is now a tri-weekly route, totally unconnected with the mail line at the end of the Portsmouth road, as travellers well know to their sorrow when they get to Halifax, and find they have to wait until the post coaches from the end of the Petersburg Railroad are empty enough to carry them. The route from Portsmouth never can be the mail route, for it passes through no place of importance; it will always be uncertain in winter time and in the stormy months of the year, for the navigation of the Bay is dangerous at such times; and in summer time the country through which the Railroad passes is considered the sickliest in Virginia and North Carolina.

What does A. P. mean when he asks can capitalists hesitate which route to invest in. Let us compare what has been done on the two routes, and see if they hesitate.

From Baltimore to Washington, the Railroad is completed; from Richmond to Fredericksburg the Railroad is half done, stock all taken, and at a premium. From Richmond to Petersburg the stock of the Railroad will be offered for sale in the course of a month; from Petersburg to the Roanoke the Railroad has been in use more than three years, and the stock is now twenty per cent. above par. From the Roanoke to Raleigh the stock of all the road is taken, and the line half located.

How is it with the other route? The Railroad from Portsmouth to the Roanoke, should have been fished a year ago, and it is not yet done; and of the Wilmington Railroad, the books have been open for months, and not more than $400,000 have been subscribed. Can A. P. tells us how much of the stock of this Railroad was taken in Norfolk and Portsmouth?

I hear it was $10,000: compare this with the subscription of Petersburg to the Raleigh and Gaston Railroad, upwards of $350,000, and taken at a time when the stocks of one Insurance and three Manufacturing Companies were offered for sale. But A. P. writes as if Charleston was to be the boundary of the two lines. We look further than Charleston—our line will not pause until it reaches New-Orleans; and judging from the rapidity with which it is going on, it will be completed in less than ten years. It will be one of the grandest lines of travel in the whole world, passing through all the towns and cities of the Union, open throughout the whole year, and unrivalled for the expedition, care and certainty with which any amount of travel can be carried; while the line by the Portsmouth Railroad will become one of its most inconsiderable feeders. At present the line passing by the Petersburg Railroad is as perfect as it can be, and travellers coming by the mail are always certain of getting on as fast as horses can carry them; but the Portsmouth line has no connexion with the mail, and nine out of ten who travel that way will be detained, sometimes for days, waiting for seats.

The readers of your Journal, Mr. Editor, may place what confidence they please in what I state, but I beg them at the same time to consider what confidence is to be given to the statements of A. P. who in our place sets down the cost of the Richmond and Fredericksburg Railroad, (a part of our route) which is sixty miles long at $1,000,000, and immediately after it he sets down the Wilmington Railroad between 140 and 150 miles long, (a part of his route) at the same sum.

A. P. says he intends to give you, some time or other, some fact in relation to the Railroad projected from the termination of the Portsmouth road to the west by Danville, S. C. In anticipation of what he may say I will give you some facts.

A Company has been Incorporated by Virginia and North Carolina to make this road, but it is looked upon as so chimerical a scheme at present, that the sum for the survey can scarcely be made up. This road is projected to run up the Roanoke along

side of a good canal and slackwater navigation, and if ever made will be tapped either by the James River Company high up the Roanoke, or by the Petersburg Railroad fifteen miles above the termination of the Portsmouth Railroad.

In conclusion Mr. Editor, I hope you will ake it in good part of one who wishes well for the success of your paper should ask you to receive with some degree of caution such communication as those of A. P. While they will do very well for newspaper puffs, their partial character readers, doubtful their claims to a place in the colums of your Journal, to which all look and wish to look, whatever may be their sectional jealousies. With high respect, PETERSBURG.

Petersburg, Va., April 3, 1836.

Albany, N. Y., April 5, 1836.

To J. E. BLOOMFIELD, ESQ.

Dear Sir,—In answer to your note of the 2nd inst., requesting me to give you the result of some experiments made by me with Locomotive Engines on planes of different degrees of elevation, I beg leave to hand you the following extract from a report recently made to the Directors of the Castleton and West Stockbridge Railroad Company, including four tables, exhibiting the load that different engines will draw at the same speed with working wheels the same diameter, and the load they will draw at different velocities, and also the load they will draw with different sized working wheels. Very Respectfully,

Your Ob't. Serv't,
WM. H. TALCOTT,
Civil Engineer.

"In order to answer the next question, viz. What will be the cost of the requisite shops, depots, carriages, wagons, and motive power, it will be necessary to determine how much load an engine will draw at one time up the different grades adopted in the estimate. The following tables, computed from experiments heretofore made on plans of different degrees of inclination, will enable us to determine this point with great accuracy.

The experiments were made on a straight road, and with the rails in full order.

The *first* column in each *table* shows the velocity in miles per hour; the *second*, the ascent in feet per mile; and the *third*, the gross load in tons which the Engine will draw at one time."

[We understand that the experiments to test make out the following tables, were made on the Hudson and Mohawk Company, they are certainly very interesting. We are much obliged to Mr. Talcott, for giving them to the public. The engines on the Hudson Railroad, are not as powerful, nor have they the improvements lately introduced, as far as we are informed, as the Engines constructed in Baltimore and Philadelphia.—ED.]

I.

ENGINE 8¼ TONS.
Working Wheels 4 ft. diam.

Velocity in Miles per Hour.	Ascent in Feet per Mile.	Gross Load in Tons.
16	0.00	97
16	10.	66
16	20.	50
16	30.	40
16	40.	33½
16	50.	29
16	60.	25½
12	0.00	116
12	10.	78½
12	20.	59½
12	30.	48
12	40.	40
12	50.	34½
12	60.	30
8	0.00	139½
8	10.	94½
8	20.	71½
8	30.	57½
8	40.	48
8	50.	41½
8	60.	36½

II.

ENGINE 10 TONS.
Working Wheels 4 ft. diam.

Velocity in Miles per Hour.	Ascent in Feet per Mile.	Gross Load in Tons.
16	0.00	116
16	10.	79
16	20.	60
16	30.	48
16	40.	40
16	50.	34½
16	60.	30½
12	0.00	139
12	10.	94½
12	20	71½
12	30.	57½
12	40.	48
12	50.	41
12	60.	36
8	0.00	167½
8	10.	113½
8	20.	86
8	30.	69
8	40.	58
8	50.	49½
8	60.	43½

III.

ENGINE 8¼ TONS.
Working Wheels 3 ft. diam.

Velocity in Miles per Hour.	Ascent in Feet per Mile.	Gross Load in Tons.
16	0 0	108½
16	10.	73½
16	20.	59
16	30.	45
16	40.	37½
16	50.	32½
16	60.	28½
12	0.00	130
12	10.	88
12	20.	66½
12	30.	53½
12	40.	45
12	50.	38½
12	60.	34
8	0.00	187
8	10.	127
8	20.	96
8	30.	77½
8	40.	64½
8	50.	55½
8	60.	49

IV.

ENGINE 10 TONS.
Working Wheels 3 ft. diam.

Velocity in Miles per Hour.	Ascent in Feet per Mile.	Gross Load in Tons.
16	0.00	130
16	10.	88½
16	20.	67
16	30.	54
16	40.	45
16	50.	39
16	60.	34
12	0.00	155½
12	10.	105½
12	20.	80
12	30.	64½
12	40.	54
12	50.	46
12	60.	40½
8	0.00	225
8	10.	152½
8	20.	115
8	30.	93
8	40.	77½
8	50.	67
8	60.	58½

For the Railroad Journal.

LOWELL, MASSACHUSETTS.

No. I.

BY HENRY COLMAN.

A recent visit to Lowell, Mass., has affected me with much surprise, and afforded a high gratification. Agriculture and Manufactures have often been denominated, and without any poetical fiction, twin sisters; their interests are so intimately interwoven with each other; in their operations, relations and success, they are so immediately dependent on each other, that I trust it will not be deemed foreign from the proper objects of the New-York Farmer, if I give some little account of this extraordinary place. Extraordinary it may well be called, for here is a city at its maturity at the age of twelve years; here is a spot which seemed almost doomed to perpetual sterility, teeming with wealth; and in that short space the residence of a few straggling farmers, gathering, by severe toil, a scanty subsistence for themselves and their cattle, from an uncongenial and pernicious soil, is transformed into a busy and buzzing hive, with a population approximating twenty thousand, active with the impetuous spirit of industry, stimulated by rapid returns of profit, taxing to its utmost speed all the powers of mechanical genius, and labor-saving art; and with a thirst for knowledge and improvement, which seems to gather quickness from sympathy with the movements of the machinery around them, erecting halls, labaratories, libraries, and cabinets, for the cultivation of science; and thus laying a broad foundation for intellectual improvement.

The moral spectacle here presented is in itself beautiful and sublime. The machinery of one of these great mills is not an unapt picture of society. Here are wheels within wheels; bands circling within bands; threads crossing threads; numerous and almost infinitely varied operations going on at the same time; much that is seen, and much that is unseen; mighty and concealed powers working in their subterraneous abodes with a tremendous agency, and sending out their influences to places far remote from their presence; human ingenuity strained to its utmost power, and human care equally concerned in the constant superintendence of this complicated apparatus; the powers of the physical world called into efficient action, moulded, guided, and brightened under the sharpened activity of intellect; the moral every where intermingling in order to preserve harmony and secure the fidelity of the intellectual and physical powers; and all, in all its parts and operations, all resting upon an unseen agency, whose activity is every where detected, but whose power is utterly unmeasured, and the mode of whose operations the brightest philosophy has not even conceived; all resolvable into one simple and great law, the law which pervades the whole material creation; holds fast the dust of the balance, the atom floating in the sunbeam, and the mightiest orb which brightens in the firmament; all, where each part retains its place, performs its duty and supplies its contribution, moving on in a beautiful harmony; producing results largely subservient to human comfort, improvement and pleasure. On the other hand, all these results are defeated, when even the most minute and the humblest part of the machinery fail to perform their proper office; determine to go wrong, or refuse to go at all; when the wheels cease to revolve, or the filaments become broken; or the combination of physical, intellectual and moral energy, felt in a thousand hands, beaming from a thousand eyes and operating in a thousand hearts, is broken up, withdrawn, relaxed or perverted. Now, this is a striking analogy of human

society; this is a world in miniature. Laws bearing a strong resemblance to each other prevail in both. They are universal laws; they are uncontrolable and unalterable to human power or pleasure; they are ceaseless in their operation; and, like the great Being who established them, they are 'without variableness or even the shadow of change.'

Lowell is principally devoted to the manufacture of cotton; but it embraces several other important factories; very extensive woolen factories, for flannel, broadcloth, kerseymere, worsted and carpeting; extensive machine shops for the construction of various kinds of machinery, from that necessary to the furnishing of a cotton mill to railroad cars and steam engines; together with a card and whip factory, planing machine, reed machine, grist and saw mills, glass works, iron furnace and powder mills, and extensive bleacheries and print works; in all, employing a population of nearly eight thousand operatives, to say nothing of the persons subsidiary to their support and accommodation, and a capital of nearly nine millions of dollars.

The mills in general are of a large size; generally of brick, and seven or eight stories in height, well lighted, ventilated, and warmed. The machinery seemed of the most improved and perfect kind; and in general, and as far as the nature of the occupation admitted, the neatness and order of the mills which I visited, most exemplary. The hours of work, exclusive of meals, average about twelve; and, as far as I could learn, it was the determination of the overseers never to employ children under twelve or thirteen years of age; and none such were employed, except where parents, as in the block printing, where they work by the piece, chose to avail themselves of their children's aid in some of the subordinate operations. These cases were almost universally those of foreigners. They were discountenanced by the superintendents; and in my opinion, where there are schools to which such children might be sent, it ought to be made a penal offence by the statute; or in any event never more than three hours' labor in the twenty-four should be exacted from them.

The cotton fabrics made here are of various qualities; the finest averaging about 42 or 45 hanks to the pound. The printing establishments, by means of engraved copper cylinders, where sometimes four impressions are given by a single revolution of the machine, are well worth visiting; and the machinery for engraving these cylinders by the sinking of steel dies is very curious, and capable of being graduated to the thirty-six thousandth part of an inch. This is almos literally splitting a hair. The invention and delineation of the figures displayed great ingenuity and skill. The shearing of the woolen fabrics is a delicate and beautiful operation; but the singeing of the fine furze or nap of the cotton cloth by dragging the piece of cloth directly over, and in contact with, a red hot iron cylinder without burning the cloth itself, strikes an unaccustomed eye with extreme astonishment. The card and whip factories are exceedingly curious and as automatic machines approach nearer, to the actual operations of intellect and intelligence than any one, who had never seen them, could imagine to be possible. Both these machines, we understand, were of domestic invention. The rapidity of the operations in almost every department of manufacture which I visited was a remarkable circumstance. A large whip was completely braided with cord in about five minutes; and the superintendent of one of the establishments informed me that he turned out one piece of cotton cloth of thirty yards in about every minute and a half while his works were in full operation.

The standard of health among the operatives in the factories, as I learnt from the best medical sources, was considered as good. Many persons, on going into a new place, and into new and different employment from that to which they have been accustomed, generally suffer at first, and pass through a kind of acclimation; but afterwards they enjoy as good health, and in some cases the health has been improved, as before entering the mills. It is obvious, however, that some of the processes must be less favorable to health than others; as there are, doubtless, predisposing causes to disease in some, which do not exist in other temperaments or constitutions.

Of the moral character of the present manufacturing population of Lowell, I feel authorized to speak in high terms. I was permitted to look in some cases at the books, in which the names of the individuals employed are recorded; and if they are discharged, the causes of that discharge are mentioned. The instances of discharge for improprieties of conduct were comparatively very few. The regulations for enforcing decorum and order are strict; and the character of the present superintendents of these establishments, such as to afford an ample guarantee that all which can be done shall be done to secure the good conduct and virtue, and to promote the comfort of the young persons under their employ. These gentlemen, acting with such a powerful influence as they necessarily exert, it is obvious, hold a highly responsible situation. The virtue and welfare of many thousands of very susceptible beings rest upon what they do or what they fail to do: and as long as they rate the value of moral character so highly, and insist upon moral correctness, as indispensable to their patronage, and encourage sentiments of high self-respect among the operatives themselves, they certainly will do much towards securing the moral purity, and advancing the moral improvement of these interesting communities. It was delightful on Sunday morning, at the first sound of the bell, to see the multitudes of well-dressed young people crowding into the Sunday School, and into the house of God; and it was a circumstance of peculiar gratification to learn, that more than three hundred of these young persons were communicants at one of the churches in that town. The congregating of such vast numbers of young people, removed in general from the restraints of home, presents, it cannot be denied, great perils to virtue. The manufacturing districts of old countries have long been stigmatized as places of most flagrant licentiousness and immorality. The character of our population is essentially different from that of the places referred to. Our manufacturing population have in general had the advantages of careful domestic training, and a good school education. They are not manufacturers for life; but design to remain only long enough in the mills to get the means of a settlement in life. They have undoubtedly, the greater part of them in New-England, been blessed with a religious education; and they are looking forward to rise in life, and feel the high worth and indispensable importance of character every where among us. These circumstances cannot fail to operate most favorably among them; and their beneficial effects are instantly to be seen. Whether they will remain sufficient will be matter of just concern with every benevolent mind.

Much is done likewise for their intellectual improvement. Frequent and most valuable courses of scientific lectures are given,—to which access is made easy by the payment of a very small fee. A social library and reading room are established likewise, on the most liberal principles; and a chemical laboratory, and a splendid mineralogical cabinet have been procured. We have never been in a community where the spirit of inquiry seemed more active, or found more patronage and encourgement.

Add to all this, that great instrument of virtue, of comfort, and of the amelioration of the condition of the poorer and laboring classes, the savings' bank, is in full operation among them; and here, as in every case where it has been tried, has produced the most salutary effects; the deposits already amount to $200,000, and promise to be greatly extended—a great proportion of the depositors being found among the young women engaged in the establishments. The perfect security of the wages of labor, is among the most efficacious protections of human virtue; and a powerful encourager of industry, frugality, and temperance—virtues so important to individual character and comfort, and to the general welfare of society.

I shall subjoin to this a statistical account of the Lowell manufactures, showing, in extensive detail, the condition of these establishments on the 1st of January of the present year,—a document well worth examination.

H. C.

March, 1836.

STATISTICS OF LOWELL MANUFACTURES, JANUARY 1, 1836, COMPILED FROM AUTHENTIC SOURCES.

CORPORATIONS,	Locks and Canals.	Merrimack	Hamilton.	Appleton.	Lowell.	Suffolk.	Tremont.	Lawrence.	Middlesex.	Boott Cotton Mills.	Total.
Capital Stock,	600,000	1,500,000	900,000	500,000	500,000	450,000	500,000	1,200,000	500,000	1,000,000	7,650,000
Number of Mills,	1	PrintW'ks, &c., 5	PrintW'ks, &c., 3.	2	Cotton and Carpet Mill in one building.	2	2	5, another or bleachery preparing.	2, and Dye House.	4	27, exclusive of Print Works, &c.
Spindles,		35,704	19,456	11,776	5,000 Cotton, besides Woollen.	10,752	11,520	31,000	4,620	Two going into operation, and two to be erected the ensuing season.	129,828
Looms,		1,253	560	380	142 Cotton, 70 Carpet.	348	404	910	38 B'cloth, 92 Casim'e.		4197
Females employed,		1,321	780	470	325	460	460	1250	350		5416
Males,	300	437	200	65	150	70	70	200	185		1377
Yards made per week,		184,000	85,000	100,000	2,500 Carp. 150 Rugs, 55,000	90,000	125,800	200,000	6300 Cas'e, 1500 Broadcloth.		849,300
Bales Cotton used in do.		120	75	95	76	86	90	180	None.		732
Pounds Cotton wro't in do.		44,000	28,000	33,000	30,000	30,000	34,000	64,000	600,000 lbs. Wool p. an. &3,000,000 Teasels.		263,000
Yards dyed and printed do.		163,000	70,000	None.	None.	None.	None.	None.			233,000
Kinds of Goods made,	Machinery. Cars and Engines for Railroads.	Prints and Sheetings, No. 22 to 40.	Prints and Drillings, No. 14 to 40.	Sheetings and Shirtings, No. 14	Carpets, Rugs, and Negro Cloth.	Drillings, No. 14.	Sheetings and Shirtings, No. 14.	Printing Cloths, Sheetings and Shirtings, No. 14 to 30, 34 to 41 in. wide.	Broadc'ths and Cassimeres.		
Tons Anthracite Coal expended p. an.		5,200	2,000	300	180	294	329	650	500		9453
Cords of Wood per annum,		1,500	1,500		500	70	60	60	1000		4690
Gallons of Oil, "		8,700	6,000	3,375	Olive 3000, Sp'm 4500.	3,840	3,692	8217	Olive 11000 Sp'm 2500.		54,824
Diameter of Water Wheels,	13	30	13	13	13	13	13	17	17 & 12	17	
Length of do. for each mill,	14	24	42	42	60	42	42	60	46 & 21	60	
Incoropràted,	1792	1822	1825	1828	1828	1830	1830	1830	1830	1835	
Commenced operations,	182	1823	1825	1828	1828	1832	1332	1833–4	1830	1836	
How warmed.	Hot Air.	Hot Air Furnace.	Hot Air Furnace.	Hot Air Furnace.	Hot Air Furnace.	Hot Air Furnace.	Hot Air Furnace.	Steam.	Wakefield Furnace & Steam.		

REMARKS.

Yards of cloth made per annum, 44,163,600
Pounds of cotton consumed, 13,676,600
Assuming half to be Upland and half New-Orleans and Alabama, the consumption in bales, averaging 361 lbs. each, is 38,000

A pound of cotton averagieg $3\frac{2}{10}$ yds.
100 pounds of cotton will produce 89 pounds of cloth.

As regards the health of persons employed, great numbers have been interrogated, and the result shows, that six of the females out of ten enjoy better health than before being employed in the mills,—of males, one half derive the same aduantage.

As regards their moral condition and character, they are not inferior to any portion of the community.

Average wages of females, clear of board, $2.00 per week.
Average wages of males, clear of board, 80 cts. per day.
Medium produce of a loom on No. 14, yarn, 38 to 49 yds. per day.
Medium produce of a loom on No. 30, 25 to 30 " "
Average per spindle, $1\frac{1}{10}$ yard per day,
Persons employed by the Companies are paid at the close of each month.
The average amount of wages paid per month, $106,000
A very considerable portion of the wages is deposited in the Savings Bank.
Consumption of starch per annum, 510,000 lbs.
Consumption of flour for starch in the mills, print works and bleachery, per annum, 3,800 bbls.
Consumption of charcoal, per annum, 500,000 bushels.

To the above named principal establishments may be added, the extensive powder mills of Oliver M. Whipple, Esq.; the Lowell bleachery; flannel mills; card and whip factory; planeing machine; reed machine; grist and saw mills—together employing about 300 hands, and a capital of $300,000. And in the immediate vicinity, glass works, and a furnace supplying every description of castings. Also, a worsted mill, formerly the Hurd Woollen Mill, under the direction of Mr. M. H. Simpson, operates 1,200 spindles, employs 125 persons, consumes 1,000,000 lbs. of wool, and 11,250 gallons of oil per annum.

The locks and Canals machine shop, included among the 27 mills, can furnish machinery complete for a mill of 5,000 spindles in four months, and lumber and materials are always at command, with which to build or rebuild a mill in that time, if required.

From the Charleston Courier.

[The writer of the following article has made a mistake in the end of his article. The vessel raised was the Peacock, of much less tonnage than the Potomac, though a very heavy vessel for her size. She was raised by the hydraulic engine, (though this is commonly called the "screw dock.")—Ed. R. R. J.]

Railroad Locks.—We have been favoured with the permission to publish the following letter from a member of the North Carolina Legislature, to a gentleman of this city, detailing the particulars of an invention, substituting *locks* for *inclined planes*, on Railways, which is well worthy of the attention of all who are interested in these great artificial channels of modern commerce, and particularly so as connected with the noble enterprize that is to make Charleston the seaport of the far West:—

Gulf of Mexico—at sea—on my way from New-York to Mobile, March 15.

DEAR SIR,—I have been on this passage since the 20th of Feb., and since I came on board have become acquainted with Mr. Taylor, of Henderson, Ky., who is the Inventor and Patentee of the Railroad Lock. He has shown me a draft of the machinery, and has so fully convinced me of its practicability, that there is not (with me) the slightest remaining doubt on the subject, and I have not the slightest doubt but that it will in a short time be adopted on most of the Railways throughout the country, and that Inclined Planes will be entirely abandoned. The only objection that can be (or yet has been) made to the lock, is, that there will probably be some loss of speed. But, when all things come to be considered, I think that this objection will not be a prominent one, nor am I willing to admit that there will be any loss, but rather a gain of speed.

The arguments in favor of the lock are these—1st, that it will reduce the length of the road, because it enables you to pursue the most direct course from point to point; and 2dly, that it will be the means, in many instances, of avoiding those deep excavations which so frequently occur, and continue to be greatly detrimental to the use of the road, by continual caving of the banks, or sides, making a double track in all such cases necessary, for the purpose of conveying off the cavings; 3dly, that in overcoming ascents on all rising ground, as

in mountains there are always gentle declivities met with, which (when gained by an ascension of a lock, or two, as the case may be) can be easily graded, and at a trifling expense, comparatively speaking; whereas, by making inclined planes, those gentle ascents are lost by being merged in the general inclination; 4thly, it will enable you to dispense with the use of stationary engines, (which will be found to be no small item,) as the machinery of the locks will always be propelled by the locomotives, without requiring them to be detached from the train of cars, the whole train being elevated at the same time with the locomotive; whereas, on inclined planes, the locomotives are always detached from the train, and if there be many cars, they are brought up in detached parcels, thereby occasioning a delay of time; 5thly, the use of locks will enable you to do the business with a less number of locomotives, as the same locomotive will carry the cars through the whole road, without requiring to be detached from the cars; whereas, the locomotives in the use of inclined planes, are always stopped at the end of the plane, and must there remain until a returning train will require its use; and lastly, there is not the slightest danger to be apprehended in ascending or descending by locks, whereas there is always great danger to be apprehended in passing inclined planes. I think enough has already been said to show that locks are decidedly preferable to inclined planes, provided their practicability can be shown, (or proved,) and this can clearly be done by mathematical calculations. I have gone into the calculations, and proven it to my entire satisfaction as to power, &c. The plan of this important machinery has been derived from the *screw docks*, the ability of which to *elevate weight* to an almost incalculable extent is not to be doubted, as sufficient tests of its powers have already been given in New-York and Baltimore. The only difference between the two machines is, that the lock by its peculiar construction, is capable of being connected with and propelled by the locomotives, which being placed in the lock, with their train of cars, may be instantly attached to the machinery of the lock, and which being put in motion, elevates itself and the cars at the same time. The elevation is gained by means of screws, the same as those of the dock. The screws of the dock are propelled by the application of manual labor, whereas those of the lock are propelled by means of machinery, and that by steam.

It is confidently believed that locks may be made to ascend and descend *thirty* feet in the space of *five* minutes from the time the locomotive is attached to it.

Mr. Taylor has given me an estimate of the expense of a lock of 130 feet in length, say sufficient to elevate a locomotive and ten produce cars, the whole weight of which, together with that of the cradle on which they stand, may be considered equal to 160 tons, to be raised *thirty* feet; this he says will be readily done by an engine of ——* horse power. The expenses, agreeably to this estimate, will be $8135; but in order to make the estimate safe, he added $1865 for contingences, making a total of $10,000. Mr. Taylor has had a brass model of the machinery made, which he will exhibit at any time when called on, and I think will be fully able to dispel all doubts on the subject. Any communication addressed to Taylor & Son, Henderson, Ky., will meet with prompt attention.

*Here the figures denoting the quantity of horse power are defaced by the seal.

Knowing that a Railway from Charleston to Cincinnati is in contemplation, and anticipating a meeting of Commissioners and Engineers sometime this spring, I have been induced to make this communication, in order that the subject might undergo a timely consideration, as it may be the means of causing a survey of more direct routes, and also be a great saving of expense in the making and keeping up the road. I have not been at home since the 4th of Nov., and am quite ignorant of what is going on upon the subject of the road.

The United States Frigate Potomac, of 1600 tons burthen, was raised by the screw dock in New-York, 22 feet in the space of 40 minutes. There were 90 men at work to propel the screws. The weight of that vessel is supposed to be equal to 1000 or 1200 tons. Now, if it were necessary that such a vessel should be raised daily, or even weekly, there is no doubt, but that it would have been constructed so as to be propelled by steam. This I think is a clear and satisfactory proof of the practicability of the lock.

RAILROAD AND CANAL INTELLIGENCE.

FOREIGN.

The *Swabian Mercury* announces that Messrs. Rothschild have taken 4000 shares, of 1000 florins each, in the Iron Railroad to be established between Galicia and some other points of the Austrian States. The works of this road will be begun in the spring, and will be executed by about 30,000 soldiers.

When the Messrs. Rothschild deal so largely in Railroad stocks, it is a fair presumption that the investment is a good one.

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A most important application of the Jacquard loom has just been made. It is now being used in raising figures on bed-quilts. The figures are in relief on the surface of the cloth, and are as firmly bound as on counterpanes made the usual way. The inspection of a 13-4ths quilt, just finished, has given great satisfaction. The effect on the prices of these articles will be astonishing. A quilt, 13-4ths, by the Jacquard loom, may be had raw for 18s.; whilst one made in the usual manner costs 30s. in wages only.—[Herald.]

Much useful information as to the surprising improvement of these looms will be found in the evidence before the Select Committee of the House of Commons.

M. Bernet, an engineer at Lyons, has ininvented a machine he calls a *Balayeuse*, by which, with the employment of only one horse, the mud in the streets, squares, and highways, is collected and thrown into a cart with extraordinary regularity, giving 100 strokes on a surface of about six yards square, and thus doing the work of 200 scavengers in the same space of time.

We wish some engineer in New-York would invent and put into operation a *Balayeuse*, he certainly would not come into bad odor.

Much debate is going on in the House of Commons on the subject of Railroads, particularly those in and near London. The intention is to prevent a needless loss of capital in improvements not likely to be beneficial either to the stockholders or the public.

All well enough, but we see from the manner in which they handle Railroads, that they are much behind us, not only in regard to the experience, but as to their general views of the subject—inmany instances we think most singularly inaccurate.

From the Mechanics' Magazine.

ON THE USES OF ZINC FOR ROOFING OF BUILDINGS, CULINARY VESSELS, ETC., AND ON THE PRODUCTS FORMED BY EXPOSURE OF THE METAL TO THE ACTION OF CORRODING AGENTS. BY L. D. GALE, M. D., PROF. GEOLOGY AND MINERALOGY IN THE N. Y. UNIVERSITY, AND PROF. CHEMISTRY IN THE N. Y. COLLEGE OF PHARMACY.

Metallic zinc has been applied to various uses in the Arts in Europe, since 1740 or 1750. Though it had been known and wrought for a long time previous by the Chinese and East Indians.

The abundance and cheapness of this metal, early attracted the attention of speculators to employ it in the useful arts, and it is stated in the Philosophical Transactions for 1747, that it casts and bores quite as well as brass, and it is proposed that it should be used for various culinary vessels as a substitute for iron and other metals, that were then, and still continue in use for such purposes. The use of this metal for culinary vessels, attempted to be made, both in England and France, was of short duration, for it was soon ascertained that the various acids that are contained in a considerable proportion of our articles used as a vegetable diet, act upon the zinc, and that the compounds formed from the union of the metal with these acids, are both disgusting to the taste, and poisonous. Besides, it is found that the metal is rapidly acted upon, by contact with moist air, or alternate wetting and drying, and that when corroded, it is soluble in water, (as we shall state when speaking of the oxide of zinc,) forming a very deleterious solution, and rendering the water wholly unfit for ordinary domestic purposes.

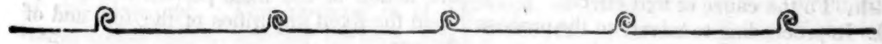
Within a few years an attempt has been made to introduce the use of this metal for culinary vessels into the United States, and it was especially recommended as having the peculiar property of preserving the sweetness of milk for a much longer time than the materials generally used for such purposes, but unfortunately the anticipations were not verified in the trials, and the use of the metal for such purposes is now almost totally abandoned.

If milk be kept in a zinc vessel, it will, if exposed to a warm atmosphere, soon begin to undergo a change. An acid is formed, which attacks the metal vessel and dissolves a portion of it, forming a salt which is both disagreeable to the taste, and deleterious to the system. The metal cannot, therefore, ever be used for the above purpose with safety.

More recently, it has been proposed to use the metal for covering the roofs of build-

ings, as a substitute for slate, copper, and other materials, that have been for a long time in general use; and unfortunately for the public, large sums have already been expended for zinc roofs, which is worse than useless, when we take into consideration the trouble and expense of removing the material, and supplying its place with some other. One could hardly see how it is possible that the public should be so deceived in the use of an article that has been so thoroughly tried and condemned, both in France and England.

Nothing is perhaps more certain than the fact, that this metal can never be used advantageously for covering roofs. In the first place, the expansion of the metal is so great by slight changes of temperature, that the junctures are exceeding liable to get out of place from expansion and contraction, hence in the present manner of putting on the metal, the buildings are constantly liable to leak. In the second place, the metal is very brittle, so that two sheets cannot be put together by folding, but must be joined in a sort of double coil, thus:



And though this roof, when new, will shed rain tolerably well, it can never be made to resist the action of melting snow, as has been proved to the satisfaction, I trust, of a considerable number of our citizens, during the past winter. The reason of the leakage is quite evident to any one who has studied the principles of capillary attraction and the laws of fluids. Suppose, for example, that a roof covered with zinc contains a depth of six inches of snow, and that the snow melts rapidly and becomes saturated with water to the depth of three inches: this would have precisely the same effect in proving the roof as if its whole surface were actually covered with water to the same depth. The capillary attraction exerted by the water in the small spaces between the coils, together with the weight of a column of water three inches in depth upon the same, is sufficient to allow water enough to pass through any roof thus covered to inundate the building.

It will be seen that the above objections apply equally to all metal roofs put together in the same manner. If we would keep our buildings dry, the snow must not be allowed to accumulate on them, or the metal used to cover the roofs must be made water tight by soldering. The past winter has tested, in the severest manner, roofing materials; heavy snows, followed by heavy rains and rapid thaws, have continually alternated during the whole season, and the damage done to buildings, furniture, and goods, will be felt for a long time.

The brittleness of zinc renders it highly objectionable. This property is increased in a tenfold proportion, by diminishing its temperature. At the freezing point of water it is almost as brittle as glass; and hence if any heavy body fall upon the coils which project above the roof, they are very liable to be broken, and when broken it is exceedingly difficult to repair them.

The third objection to the use of zinc for roofing is, that it is dissolved in the water which runs over the roof, and thus renders it unfit for all domestic purposes. This fact seems to be one that has not yet attracted the attention of the public. Having unfortunately resided under a zinc roof, and shared largely in its deleterious effects, I have been led to examine the qualities communicated to the water by means of the zinc.

There are two distinct compounds formed by exposing to the action of the air this metal. If the metal be heated to whiteness in the open air, it takes fire and burns with intense brilliancy, forming an exceedingly light, white substance, which is a compound of the metal with a portion of the oxygen of the air. It is therefore an oxide of zinc, and generally denominated the flowers of zinc. This is the only compound of zinc and oxygen described in most of the books; it is a white powder so light as readily to float in the atmosphere, and is perfectly insoluble in water.

If zinc be exposed to moist atmosphere, it becomes covered with a gray coating, which is described as a mixture of the white oxide and the metal; but as the gray compound is soluble in water, and neither of the others possess the same property, the opinion advanced in the books can hardly be correct. Berzelius, who first described the gray compound, considers it as a sub-oxide, though he does not mention the fact that it is soluble in water. This last property is one that renders the metal highly objectionable as a roofing, for the sub-oxide formed by the action of alternate wet and dry weather, is dissolved off by the rains, and carried into the cisterns, deteriorating the water, and rendering it almost entirely unfit for all domestic purposes. It thus acquires a styplic, coppery taste, and if taken into the stomach, produces nausea and vomiting. It decomposes soap, and produces that property in water called hardness, which renders it unfit for washing.

If the water which has dissolved the sub-oxide of zinc be freely exposed to the air, oxygen will be absorbed, and the sub-oxide will be gradually converted into the white oxide or flowers of zinc, which being insoluble in water, falls to the bottom as fast as formed in the state of a white powder, and thus the water at length becomes nearly pure again. This effect is quite perceptible after a dry season, when the water constantly becomes better, until it is again deteriorated by a fresh fall of rain, which dissolves more of the metal. Now, since rain water is so valuable an article in all large towns and cities, any agent that would deteriorate it must be got rid of, even if it be at a considerable expense. Besides, rain water, after being filtered through sand and charcoal, is now coming into use for drinking, and substituted for the spring water, which has been formerly universally used for this and for all culinary purposes. It is, therefore, quite certain, that the use of zinc as a roofing for dwelling houses, at least, must be entirely abandoned, or otherwise, the use of rain water which runs from it must be partially or entirely discontinued.

From the London Mechanics' Magazine.

Why cannot our artists attempt something of this kind?

EMBOSSING ON WOOD.

Sir,—I have been shown some very beautiful specimens of embossing upon veneer, principally floral and arabesque designs, upon rosewood, maple, mahogany, elm, and other hard woods. The relief is almost *alto*, and has quite the appearance of carving. I understand the invention is patented, but that the inventor, M. Caccia, an Italian, has been prevented from bringing it into extensive operation from the primarily expensive nature of the machinery, and the jealousy of cabinet-makers, who declare that it would supersede carving and inlaying, and so spoil their business. The process may be so varied that the relief will be brought out in different colors; it is also applicable to the embossing of cloths, kerseymeres, waist-coat pieces, paper-hangings, and things of a like nature.

This is the first instance, as far as I know, in which designs have been impressed upon wood—embossing is common enough upon card, paper, calico, and such fabrics; and unless there be some improvement in the process, I do not know that the patent will hold good. Making the parts in relief come up of different colors, I believe to be new; and upon this possibly the patent rests.

Embossed hard fancy woods might be very extensively and very beautifully applied to the ornamenting of cabinets, work-boxes, &c., and to the panels of doors and wainscoting. Herewith I send you some specimens, that in the effect produced, you may judge for yourself.

I am, &c.

P. B. T.

November, 1835.

From the London Mechanic's Magazine.

REMARKS ON THE CONSTRUCTION OF BOG-ROADS.

Sir,—There are some instances where vehicles are obliged to run in the same track or rut, either owing to the sloping sides of a road, its inequality, or to facilitate the journey of the horses on account of its being boggy.

In the first case, they run on the crown of the road, consequently in the same rut; and as the traffic increases, the rut becomes greater. The inequalities of a road are a great evil; and when the road is boggy as well, the sides are still more avoided, as the water in running over the sloping sides is absorbed in the yielding substance, and renders passage over them impossible. Ruts cease to exist if the roads are worn equally in every part; therefore, if the roads are perfectly level, or nearly flat, every vehicle will take a separate track. The first thing to be considered in the construction of bog-roads, after the ground is well drain-

ed, is the making the surface perfectly level; and after that has been effected, if concrete, similar to what is used in securing the foundations of buildings, and mixed with broken stone, were thrown in, and exposed for a considerable time, it would be superior to any other method previously adopted. When hardened sufficiently for constant use and friction, time alone would soon prove whether it would not be more serviceable and efficacious than either the method of "laying branches of trees on the level of the strata," or "firm heathy sods." When such roads are situated near any place from whence lime may be obtained, or gravel could be had in abundance, additional facilities would be offered for effecting this method, which, as it becomes by exposure as firm as a rock, would certainly be found beneficial. The additional expense attending the construction of such a road, if the work is properly performed, would also be compensated by the permanent and substantial road which would be the result. Yours, &c.

FREDERICK LUSH.

Charles-square, Hoxton, Nov. 20, 1835.

[Some useful hints as to the improvement of our common roads, in similar situations, may be drawn from the foregoing article.—ED. M. M.]

The following article gives the best general description we have seen of the "Application of the Hot Blast." It is well worth reading.

From the London Mechanic's Magazine.

ON THE APPLICATION OF THE HOT BLAST IN THE MANUFACTURE OF CAST-IRON.

BY THOMAS CLARKE, M. D., PROFESSOR OF CHEMISTRY IN MARISCHALL COLLEGE, ABERDEEN.

(Read before the Royal Society of Edinburgh, March, 1835.)

Among persons interesting themselves in the progress of British manufactures, it can scarce fail to be known, that Mr. Neilson of Glasgow, manager of the Gas-Works in that city, has taken out a patent for an important improvement in the working of such furnaces as, in the language of the patent, "are supplied with air by means of bellows, or other blowing apparatus." In Scotland Mr. Neilson's invention has been extensively applied to the making of cast-iron, insomuch that there is only one Scotch iron-work where the invention is not in use, and in that work apparatus is under construction to put the invention into operation. Apart from the obvious importance of any considerable improvement in the manufacture of so valuable a product as cast-iron, the invention of Mr. Neilson would merit attention, were it only for the singular extent of the improvement effected, compared with the apparent simplicity—I had almost said inadequacy—of the means employed. Having, therefore, by the liberallity of Mr. Dunlop, proprietor of the Clyde Iron Works, where Mr. Neilson's invention was first put into operation, obtained full and free access to all information regarding the results of trials of the inventions in those works, on the large scale of manufacture, I cannot help thinking that an authentic notice of these results, together with an attempt to explain the cause of them, will prove acceptable to the Royal Society of Edinburgh. And that these results, as well as the cause of them, may be set forth with clearness, I shall advert

1st. To the process of making iron, as formerly practised.

2d. To Mr. Neilson's alteration on that process.

3d. To the effect of that alteration.

4th. To the cause of that effect.

I. In proceeding to advert to the process of making cast-iron, as formerly practised, it cannot here be necessary to enter into much detail in explanation of a process, long practised and extensively known, as this has been; nor, indeed, shall I enter into detail, farther than, to the general scientific reader, may be proper to elucidate Mr. Neilson's invention.

In making cast-iron, then, the materials made use of were three—

The ore,
The fuel,
The flux.

The ore was clay iron-stone, that is to say, carbonate of iron, mixed, in variable proportions, with carbonates of lime, and of magnesia, as well as with aluminous and siliceous matter.

The fuel made use of at Clyde Iron Works, and in Scotland generally, was coke, derived from splint coal. During its conversion into coke, this coal underwent a loss of 55 parts in the 100, leaving 45 of coke. The advantage of this previous conversion consisted in the higher temperature produced by the combustion of the coke, in consequence of none of the resulting heat disappearing in the latent form, in the vapors arising from the coal, during its conversion into coke.

The flux was common lime-stone, which was employed to act upon the aluminous and siliceous impurities of the ore, so as to produce a mixture more easy to melt than any of the materials of which it was made up, just as an alloy of tin and lead serves as a solder, the resulting alloy being more easy to melt than either the lead or the tin apart.

These three materials—the ore, the fuel, and the flux—were put into the furnace, near the top, in a state of mixture. The only other material supplied was air, which was driven into the furnace by pipes from blowing apparatus, and it entered the furnace by nozzles, sometimes on two opposite sides of the furnace, sometimes on three, and sometimes, but rarely, on four. The air supplied in this manner, entered near the bottom of the furnace, at about 40 feet from the top, where the solid materials were put in. The furnace, in shape, consisted, at the middle part, of the frustrums of two cones, having a horizontal base common to both, and the other and smaller ends of each prolonged into cylinders, which constituted the top and bottom of the furnace, as may be well enough conceived from the sectional sketch on the margin.

The whole of the materials put into the furnace, resolved themselves into gaseous products, and into liquid products. The gaseous products, escaping invisible at the top, included all the carbonaceous matter of the coke, probably in the form of carbonic acid, except only the small portion of carbon retained by the cast-iron. The liquid products were collected in the cylindrical reservoir, constituting the bottom of the furnace, and there divided themselves into two portions, the lower and heavier being the melted cast-iron, and the upper and lighter being the melted slag, resulting from the action of the fixed portion of the flux upon the fixed impurities of the fuel and of the ore.

II. Thus much being understood in regard to the process of making cast-iron, as formerly practised, we are now prepared for the statement of Mr. Neilson's improvement.

This improvement consists essentially in heating the air in its passage from the blowing apparatus to the furnace. The heating has hitherto been effected by making the air pass through cast-iron vessels, kept at a red heat. In the specification of the patent, Mr. Neilson states, that no particular form of heating apparatus is essential to obtaining the beneficial effect of his invention; and, out of many forms that have been tried, experience does not seem to have yet decided which is best. At Clyde Iron Works, the most beneficial of the results that I shall have occasion to state, were obtained by the obvious expedient of keeping red-hot the cast-iron cylindrical pipes, conveying the air from the blowing apparatus to the furnace.

III. Such being the simple nature of Mr. Neilson's invention, I now proceed to state the effect of its application.

During the first six months of the year 1829, when all the cast-iron in Clyde Iron Works was made by means of the cold blast, a single ton of cast-iron required for fuel to reduce it, 8 tons 1¼ cwt. of coal, converted into coke. During the first six months of the following year, while the air was heated to near 300° Fahr., one ton of cast-iron required 5 tons 3¼ cwt. of coal, converted into coke.

The saving amounts to 2 tons 18 cwt. on the making of one ton of cast-iron; but from that saving comes to be deducted the coals used in heating the air, which were nearly 8 cwt. The nett saving thus was 2½ tons of coal on a single ton of cast-iron. But during that year, 1830, the air was heated no higher than 300° Fahr. The great success, however, of those trials, encouraged Mr. Dunlop, and other iron-masters, to try the effect of a still higher temperature. Nor were their expectations disappointed. The saving of coal was greatly increased, insomuch, that about the beginning of 1831, Mr. Dixon, proprietor of Calder Iron Works, felt himself encouraged to attempt the substitution of raw coal for the coke before in use. Proceeding on the ascertained advantages of the hot blast, the attempt was entirely successful; and, since

that period, the use of raw coal has extended so far as to be adopted in the majority of the Scotch iron works. The temperature of the air under blast had now been raised so as to melt lead, and sometimes zinc, and therefore was above 600° Fahr., instead of being only 300°, as in the year 1830.

The furnace had now become so much elevated in temperature, as to require, around the nozzle of the blow-pipes, a precaution borrowed from the finery-furnaces, wherein cast-iron is converted into malleable, but seldom or never employed where cast-iron is made by means of the cold blast. What is called the *tweer*, is the opening in the furnace to admit the nozzle of the blow-pipe. This opening is of a round funnel shape, tapering inwards, and it used always to have a cast-iron lining, to protect the other building materials, and to afford them support. This cast-iron lining was just a tapering tube, nearly of the shape of the blow-pipe, but large enough to admit it freely. Now, under the changes I have been describing, the temperature of the furnace became so hot near the nozzles, as to risk the melting of the cast-iron lining, which, being essential to the *tweer*, is itself commonly called by that name. To prevent such an accident, an old invention, called the *water-tweer*, was made available. The peculiarity of this tweer consists in the cast-iron lining already described being cast hollow instead of solid, so as to contain water within, and water is kept there continually changing as it heats, by means of one pipe to admit the water cold, and another to let the water escape when heated.*

During the first six months of the year 1833, when all these changes had been fully brought into operatien, one ton of cast-iron was made by means of 2 tons $5\frac{1}{4}$ cwt. of coal, which had not previously to be converted into coke. Adding to this 8 cwt. of coal for heating, we have 2 tons $13\frac{1}{4}$ cwt. of coal required to make a ton of iron; whereas, in 1829, when the cold blast was in operation, 8 tons $1\frac{1}{4}$ cwt. of coal had to be used. This being almost exactly three times as much, we have, from the change of the cold blast to the hot, combined with the use of coal instead of coke, *three times as much iron made from any given weight of splint coal.*

During the three successive periods that have been specified, the same blowing apparatus was in use; and not the least remarkable effect of Mr. Neilson's invention, has been the increased efficacy of a given quantity of air in the production of iron. The furnaces at Clyde Iron Works, which were at first three, have been increased to four, and, the blast machinery being still the same, the following were the successive weekly products of iron during the periods already named, and the successive weekly consumpt of fuel put into the furnace, apart from what was used in heating the blast:—

	Tons.			Tons.			Tons.	
In 1829, from 3 furnaces,	111	Iron	from	403	Coke,	from	888	Coal.
In 1830, from 3 furnaces,	162	Iron	from	376	Coke,	from	836	Coal.
In 1833, from 4 furnaces,	245	Iron				from	554	Coal.

Comparing the product of 1829 with the product of 1833, it will be observed that the blast, in consequence of being heated, has reduced more than double the quantity of iron. The fuel consumed in these two periods we cannot compare, since, in the former coke was burned, and in the latter coal. But on comparing the consumpt of coke in the years 1829 and 1830, we find that although the product of iron in the latter period was increased, yet the consumpt of coke was rather diminished. Hence the increased efficacy of the blast appears to be not greater than was to be expected, from the diminished fuel that had become necessary to smelt a given quantity of iron.

On the whole, then, the application of the hot blast has caused the same fuel to reduce three times as much iron as before, and the same blast twice as much as before.

The proportion of the flux required to reduce a given weight of the ore, has also been diminished. The amount of this diminution, and other particulars, interesting to practical persons, will appear on reference to a tabular statement supplied by Mr. Dunlop, and printed as an appendix to this paper. Not further to dwell on such details, I proceed to the last division of this paper, which is,—

IV. To attempt an explanation of the foregoing extraordinary results.

Subsidiary to this attempt, it is necessary to discriminate between the quantity of fuel consumed, and the temperature produced. For instance, we may conceive a stove to be kept at the temperature of 500° Fahr., and lead to be put into such a stove for the purpose of being melted. Then, since the melting point of lead is more than 100° higher, it is evident that whatever fuel might be consumed in keeping that stove at the temperature of 500°, the fuel is all consumed to no purpose, so far as regards the melting of lead, in consequence of deficiency in the temperature. In the manufacture of cast-iron likewise, experience has taught us, that a certain temperature is required in order to work the furnace favorably, and all the fuel consumed, so as to produce any lower degree of temperature, is fuel consumed in vain. And how the hot blast serves to increase the temperature of a blast furnace, will appear on adverting to the relative weights of the solid and of the gaseous materials made use of in the reduction of iron.

As nearly as may be, a furnace, as wrought at Clyde Iron Works in 1833, had two tons of solid materials an hour put in at the top, and this supply of two tons an hour was continued for 23 hours a-day, one half hour every morning, and another every evening, being consumed in letting off the iron made. But the gaseous material—the hot air—what might be the weight of it? This can easily be ascertained thus; I find, by comparing the quantities of air consumed at Clyde Iron Works, and at Calder Iron Works, that one furnace requires of hot air from 2,500 to 3,000 cubical feet in a minute. I shall here assume 2,867 cubical feet to be the quantity; a number that I adopt for the sake of simplicity, inasmuch as, calculated at an avoirdupois ounce and a quarter, which is the weight of a cubical foot air at 50° Fahr., these correspond precisely with 2 cwt. of air a minute, or *six tons an hour*. Two tons of solid material an hour, put in at the top of the furnace, can scarce hurtfully affect the temperature of the furnace, at least in the hottest part of it, which must be far down, and where the iron, besides being reduced to the state of metal, is melted, and the slag too produced. When the fuel put in at the top is coal, I have no doubt that, before it comes to this far-down part of the furnace—the place of its useful activity—the coal has been entirely coked; so that, in regard to the fuel, the new process differs from the old much more in appearance than in essence and reality. But if two tons of solid material an hour, put in at the top, are not likely to affect the temperature of the hottest part of the furnace, can we say the same of six tons of air an hour, forced in at the bottom near that hottest part? The air supplied is intended, no doubt, and answers to support the combustion; but this beneficial effect is, in the case of the cold blast, incidentally counteracted by the cooling power of six tons of air an hour, or 2 cwt. a minute, which, when forced in at the ordinary temperature of the air, cannot be conceived otherwise than as a prodigious refrigeratory passing through the hottest part of the furnace, and repressing its temperature. The expedient of previously heating the blast obviously removes this refrigeratory, leaving the air to act in promoting combustion, without robbing the combustion of any portion of the heat it produces.

Such, I conceive, is the palpable, the adequate, and very simple explanation of the extraordinary advantages derived in the manufacture of cast-iron, from heating the air in its passage from the blowing apparatus to the furnace.

Marischall College, Aberdeen,
Jan. 10, 1835.

APPENDIX.

The blowing-engine has a steam-cylinder of 40 inches diameter, and a blowing-cylinder of 8 feet deep and 80 inches diameter, and goes 18 strokes a minute. The whole power of the engine was exerted in blowing the three furnaces, as well as in blowing the four, and in both cases there were two tweers of 3 inches diameter to each furnace. The pressure of the blast was $2\frac{1}{4}$ lb. to the square inch. The fourth furnace was put into operation after the water-tweers were introduced, and the open spaces round the blow-pipes were closed up by luting. The engine then went less than 18 strokes a minute, in consequence of the too great resistance of the materials contained in the three furnaces to the blast in its passage upwards.

* An incidental advantage attended the adoption of the water-tweers, inasmuch as these made it practicable to lute up the space between the blow-pipe nozzle and the tweers, and thus prevent the loss of some air that formerly escaped by that space, and kept up a bellowing hiss, which, happily, is now no longer heard.

Materials constituting a Charge.

	cwt.	qrs.	lbs.
1829—Coke,	5	0	0
Roasted Ironstone,	3	1	14
Limestone,	0	3	16
1830—Coke,	5	0	0
Roasted Ironstone,	5	0	0
Limestone,	1	1	16
1833—Coal,	5	0	0
Roasted Ironstone,	5	0	0
Limestone,	1	0	0

Table showing the Weight of Cast-Iron produced, and the Average Weight of Coals made use of, in producing a ton of Cast-Iron, at Clyde Iron Works, during the years 1829, 1830, and 1833, the Blowing-engine being the same.

COKE AND COLD AIR.							COKE AND HEATED AIR.							COAL AND HEATED AIR						
1829	Weekly product of Cast-Iron by three Furnaces.			Average of Coals used to 1 Ton of Cast-Iron.			1830	Weekly product of Cast-Iron by three Furnaces.			Average of Coals used to 1 Ton of Cast-Iron.			1833	Weekly product of Cast-Iron by four Furnaces.			Average of Coals used to 1 Ton of Cast-Iron.		
	T.	C.	Q.	T.	C.	Q.		T.	C.	Q.	T.	C.	Q.		T.	C.	Q.	T.	C.	Q.
Jan. 7	137	18	2	8	12	1	Jan. 6	176	10	2	5	2	2	Jan. 9	375	8	0	2	12	3
14	148	2	0	6	9	2	13	181	12	2	5	0	2	16	267	18	0	2	4	0
21	148	8	2	6	11	3	20	172	5	2	5	0	2	23	270	7	2	2	3	1
28	138	9	2	7	0	2	27	178	7	0	4	19	0	30	250	9	0	2	4	0
Feb. 4	125	13	0	7	12	1	Feb. 3	164	8	0	5	4	0	Feb. 6	265	3	2	2	1	0
11	136	19	0	7	13	1	10	172	12	0	5	4	0	13	202	10	0	2	4	3
18	130	16	2	7	11	3	17	163	9	0	5	9	0	20	257	1	0	2	4	3
25	105	12	2	7	10	0	24	170	1	0	5	3	0	27	264	0	0	2	5	1
Mar. 4	101	8	1	7	17	2	M r. 3	154	19	0	5	10	3	Mar. 6	234	13	0	2	5	2
11	111	2	0	8	2	2	10	154	16	0	5	9	2	13	238	7	2	2	7	1
18	114	10	2	7	6	2	17	151	18	2	5	9	3	20	205	13	0	2	10	2
25	110	94	0	8	8	1	24	163	17	0	5	5	1	27	217	14	0	2	2	3
Apr. 1	111	4	0	8	7	2	31	163	8	2	5	11	0	Apr. 3	220	7	0	2	14	2
8	107	7	0	8	3	0	Apr. 7	147	10	0	5	7	0	10	280	9	2	2	0	3
15	91	12	2	8	15	0	14	154	9	2	5	2	0	17	304	7	0	1	17	3
22	85	13	0	9	13	0	21	163	4	0	4	19	0	24	248	12	2	2	3	0
29	91	14	2	9	6	2	28	148	12	2	5	4	0	May 1	245	7	2	2	6	0
May 6	92	7	2	8	8	2	May 5	162	10	2	5	2	2	8	200	17	0	2	8	0
13	94	6	0	9	2	1	12	149	13	0	5	3	2	15	246	4	2	2	5	3
July 8	88	4	2	8	16	3	19	162	4	0	5	5	0	22	219	1	2	2	6	0
15	91	13	0	8	5	0	26	165	7	2	4	18	3	29	231	2	0	2	8	0
22	97	12	0	8	2	1	June 2	169	4	0	5	2	2	June 5	235	16	0	2	6	2
29	104	15	2	7	10	2	9	157	17	0	5	1	0	12	232	10	0	2	7	1
Aug. 5	106	17	2	7	7	2	16	164	0	0	4	17	3	19	271	1	2	2	1	0
12	93	1	0	8	6	0	23	149	3	0	4	18	0	26	262	3	2	2	3	0
19	113	7	0	8	18	2	30	162	16	2	4	16	3	½ w. 30	22	16	0	2	5	1
	2878	18	0	209	19	0		4215	6	0	134	6	2		6370	3	0	58	18	3
Average	110	14	2	8	1	1		162	2	2	5	3	1		245	0	0	2	5	1

The correspondent by whom we have been obligingly favored with the preceding paper, makes himself the following remarks on the subject of which it treats.—ED. M. M.

"The best application of the hot blast that *I* have yet seen, is at the Wilsonton Iron Works, near Lanark and Whitburn. At these works the heated air is never at a *lower* temperature than the melting point of lead (612°.) This is readily *tested* by inserting a small bar of lead into an opening in the pipe for the purpose, a little way before it enters the furnace; the lead is *instantly* melted. When in good working order, zinc is fused (700°) in the same way. The air is heated in passing through a series of iron pipes of *small* diameter, fixed upright in a brick oven, and kept at a red heat; the heated air entering the furnace by *four tweers*. 'The Condie pipes,'—so called from Mr. John Condie, the manager of the Wilsonton Iron Works, and late of the Calder—last much longer than the ill-arranged heating apparatus (with pipes of large diameter) at the Clyde Iron Works, and effect a much greater saving in fuel.

"The *raw coal* when used as the fuel, has the disadvantage of soon filling the furnace, and is also found to produce an inferior quality of iron, to that made by use of coke. It is, therefore, not unlikely to be soon, generally, given up."

From the Journal of the Franklin Institute.

REPORT ON THE USE OF THE HOT AIR BLAST IN IRON FURNACES AND FOUNDRIES, BY A. GUEYVEAU, ENGINEER AND PROFESSOR IN THE ROYAL SCHOOL OF MINES.

(Translated for this Journal, by Professor A. D. Bache.)

(Continued from page 199.)

The following details confirm the abstract of results just given.

1st. Furnaces using coke or coal.

The results as to economy by using the hot air blast are stated, in the Scottish works, as nearly 3 to 2. At Vienna, the same quantity of coke which was used for 1.075 of ore and flux in the charge, is now used for 1.51. At La Voulte, where the air is heated only to 320° in the manufacture of iron for forging, 1 part of coke is now used to 2.1 parts of ore and flux. At the furnace of Terre-Noire, 1 lb. of coke is used to 1.82 of the mixed ore and flux.

At Torteron, where a mixture of coke (1-3) and charcoal (2-3) is used as fuel, 1 lb. of the fuel is used to 2.83 lbs. of the mixed charge, with the hot air blast. While at the furnace of Guerche, where they use the same ore, flux and fuel, but with the cold air blast, 1 lb. of the fuel is used for 2.98 lbs. of the mixed ore and flux.

At Ancy-le-Franc, where charcoal is used, in the proportion of 2-3 oak charcoal and 1-3 of white wood, 2.1 lbs. of the ore and flux require 1 lb. of fuel with hot air, and 2.5 lbs. require the same fuel with heated air. At Wasseralfingen, the increase of the mineral charge, when hot air is used, is 1.43 to 1, and at Riouperoux, 1.42 to 1.

When iron for forging only is made, and fuel is scarce, it is thought that the hot air blast will be of but little advantage; the company who use the patent for this blast have stipulated for the Creusot furnace, not to pay for the construction of the heating apparatus, in case no real advantage is derived from its use.

In those furnaces which use the hot air blast, and where the mineral part of the charge has been increased, the charges pass less rapidly than formerly, and there are, of course, fewer charges in a given time, but so much more ore passes in the same time that the run of iron is much increased This increase is greater when the iron is made of the quality for forging than when made for casting. At Vienna, where iron of the second mentioned quality is manufactured, the daily yield has increased in the ratio of 1.22 to 1, while at Janon, where that of the first named quality is used, the ratio is 1.6 to 1. At La Voulte, they produce in twenty-four hours 8 or 9 tons of iron for forging, and it is stated that with an increase of the blast, the yield could be increased to 11 or 12 tons without injuring the quality of the iron.

The greatest advantage from the hot air blast is doubtless to be found in the diminution in the enormous quantity of fuel (coal) used in some of the English works. The results obtained in the works of the south of France are the following. At Vienne, where they chiefly make iron for casting, they tried the Clyde form of heating apparatus, but abandoned it for that of Calder, by which they heat the air above the melting point of lead. The economy of coke has been in the ratio of 1.37 to 2.50. And the daily yield has increased from 4½ to 5 or 6 tons of iron. The daily product of the two furnaces at Janon, where Taylor's heating apparatus is used, is 8 or 9 tons of iron for forging, by the consumption per ton of 1.20 to 1.40 of coke. This does not include the fuel required to heat the iron. Each of the three furnaces of La Voulte turn out 9 tons of iron for forging, while, with the cold blast, they made but 7½ to 8 tons of the best quality, under the most favorable circumstances. The consumption of coke is now 1.25 to 1.30 tons for each ton of iron, besides about 600 lbs. per ton, which is required to heat the blast; the former consumption was 2.10 to 2.30 tons of fuel for one of iron. The experiments made in France with crude coal and the hot air blast, have not been conclusive in regard to its advantages, compared with the cold blast.

At the new Torteron furnace, where charcoal (2-3) and coke (1-3) are used, the consumption of fuel is about the same for the two kinds of blast. With the hot air blast, however, they make excellent pig iron for castings without any difficulty.

2. *On the use of raw coal in smelting furnaces.*

The substitution of raw coal for coke is doubtless the source of the very great eco-

nomy observed in the Scotch works, where the heated air blast has been introduced. It was generally believed in this country, as late as 1833, that the hot air blast was indispensable to the use of the fat varieties of coal, without cokeing. It was known that certain dry bituminous coals might be used as fuel, even without admixture with coke, and without heating the blast, as is still practised in Wales.

In some of the English furnaces, on account of the cakeing of the coal, or of its containing a considerable proportion of sulphur, coke is still used with the hot air blast. In one of the Welsh works, they partly coke the coal, and with good effect; a hint which may, perhaps, be improved upon here.

The following observations on the use of coal, of different qualities, with the common blast, have been collected.

A carbonate of iron was advantageously smelted at Vizille,* with a mixture of coke, and of very compact anthracite, with the cold air blast. The high price of the coke rendered the manufacture unprofitable. It has been found, at Creusot, that raw coal could be mixed with the coke used, in the proportion of fifty per cent. of the whole fuel, without injury to the quality of the iron, and without diminution in its quantity. At Decazeville, M. Coste found that all the neighboring coals could be used with the cold air blast, and the furnaces there, as well as at Firmy, have since used no other fuel, except when it was necessary to work up the fine coal. The same weight of raw coal is now used as was formerly of coke. The pig iron has not deteriorated in quality, and the daily yield is the same as before, namely, about five tons.† In all these cases, there is an advantage resulting from the less quantity of earthy matters in the charges, than when coke is used; it has been found at Decazeville, that they require but half the quantity of flux used with coke, when raw coal is substituted for it.

A fact of an opposite kind was presented at Alais, where an attempt to mix raw coal with coke was unsuccessful, the yield of the furnace being sensibly diminished when the coal was but one sixth of the charge. The coal appears, nevertheless, to be well adapted to this purpose.

At several of the furnaces, such as Terre Noire, &c., coke made from the fine coal is cheaper than the coarse coal, and no advantage can be realised by the use of raw coal.

In regard to the different kinds of coal, it has been observed that those which cake too much, or which fly to pieces, are both ill adapted to use in the smelting furnace. As to other varieties, they may be used either with or without admixture of coke. others may work well with cold air. Some

The question as to whether the hot air blast is, or is not, necessary, seems to be undecided, observations being contradictory. It is possible that some kinds of coal may render the use of the hot air blast advantageous, or even absolutely require it, while may require the hot air blast to drive off the bitumen before they reach the boshes, while others may not need such aid.*

3. *Smelting furnaces where charcoal is used as a fuel.*

These furnaces requiring a less draught, and being lower than those for coke, are peculiarly well adapted for placing the heating apparatus at the trunnel head. At Wasseralfingen, the pipes are nearly vertical, and pass from the lower part of the furnace to the platform, and back again to the tuyeres; at Ancy-le-Franc they are nearly horizontal, and directly above the trunnel head. An apparatus formed of curved pipes, passing in an arched form over the trunnel head, has been proposed by Mr. Taylor, but appears not to be as durable as that just referred to.

The experience of several years has proved that the heat of the combustible matters which take fire on issuing from the trunnel head, and of the other gaseous matters, will raise the temperature of the blast to 570° Fah. To this method of heating, several objections have been made; first, tnat in a well constructed furnace, the air issuing at the trunnel head should not be at as high a temperature as that required for the blast. This objection is not founded on observation, for, besides the heated gases which escape, and which do not burn, there are combustible ones escaping which take fire at the trunnel head, and give out heat by their combustion. It is a well known fact, that, in many works in France and Germany, the heat which would, otherwise, be lost, is applied to various useful purposes. A second objection is, that this mode of heating is dependent upon the proper working of the furnace, and may fail at the very time that heat is required to remove an obstruction in the furnace, from the effect of the very obstruction which is to be removed. This difficulty is easily obviated by burning a few faggots in the flues containing the air pipes, when extra heat is required.

In fact, this apparatus has proved generally satisfactory, requiring neither additional fuel, nor attendance. The exterior of the tubes should be cleaned about every fortnight, to remove dust, and other matters, which would impede the communication of heat. The cleansing of the long horizontal pipes, such as are used at Torteron, is an inconvenient matter.

It may be well to repeat, here, the results obtained by the hot air blast at Wasseralfingen. At a cost only of the construction and repairs of the heating apparatus, the daily yield of the furnace was increased thirty-nine per cent.; the quality of the iron, for casting, was not deteriorated; and the consumption of fuel was diminished from 1 to .61. The temperature of the air was from 390° to 400° Fah.

At Ancy-le-Franc, the consumption of charcoal per ton of iron was diminished twenty per cent., while the iron was improved for castings. The air was heated to 570°. The want of power of the blowing machine prevented a due supply of heated air, and the daily yield of the furnace was decreased.

I have been informed that there are several works in Franche-Comte, where they heat the air blast from the trunnel head. They have a greater daily yield, and consume less fuel than formerly, but state that the working of the furnace is not so regular as before. This, probably, depends upon some defect in their construction, since it certainly is not a usual accompaniment of the hot air blast.

At Hayange, (Moselle,) a furnace twenty-six feet in height, and using charcoal, was supplied with the hot air blast. By means of an apparatus like that used at Wasseralfingen, the air was raised to 612° Fahr., and even above this point. The area of the blast pipe was doubled, and the pressure slightly diminished. The charge of ore was increased from 430 lbs. for 22¼ cubic feet of charcoal, to 680 lbs. The same number of charges were made per day, and the gain resulted only from the increase of ore in each charge. The heating apparatus has required no repairs since its establishment a year ago. In another furnace, at the same place, the heating apparatus having given way, the cold air blast was resumed at an additional expense of twelve per cent. of charcoal, per ton of iron.

It is stated in a German journal,* that. by heating the air from a hydraulic blowing machine, by an apparatus at the trunnel head of a furnace, a saving of twenty-five per cent. of fuel had resulted. The air was heated to 480° Fah.

At Plons, in Switzerland, they have used the hot air blast to advantage, the fuel being a mixture of wood and charcoal. Each charge consists of 81 lbs. of charcoal, nearly half being from hard, and the rest from resinous wood, and 198 lbs. of pine wood, which would have yielded 48 lbs. of light charcoal; of 220 lbs. of ore containing 51 per cent. of iron, and 60 lbs. of an argillaceous flux. From 18 charges they obtain, in twelve hours, 20,196 lbs. of pig iron. The economy is reckoned at about 33 per cent.

These results are more satisfactory than those furnished by charcoal, alone, and cold air, or even than those afforded by charcoal and the hot air blast. So successful are they considered, that a saw mill has been established to cut the wood to the required size.

(To be continued.)

Fossil Tree.—In the quarry from which stones are at present being taken for the new church erecting at the Milton of Balgonie, was lately discovered a large fossil tree. It is lying nearly horizontal, and is as yet attached by about two thirds of its circumference to the sandstone. It is about fifteen inches in diameter, and about seven feet of it are at present visible. As it tapers slowly to the outer end, the portion still undiscovered is probably considerable. It is wholly composed of white sandstone similar to that in which it is imbedded. This quarry is remarkably rich in vegetable impressions. Casts or marks of palm trees are to be found in great beauty and abundance.—[Sunderland Herald.]

* For an account of these important experiments, see this Journal, vol. xv., p. 346.

† In 1835, it is stated that the same furnaces run six tons per twenty-four hours.

* It is stated that, at Frederickshutte, in Silesia, a successful attempt has been made to smelt with raw coal as a fuel, and with the cold air blast. The coal does not cake readily.—[Erdman's Chem. Journ.]

* Erdman's Journal, vol. xviii., p. 340, 1833.

AGRICULTURE, &c.

From Hovey's Horticultural Magazine.

RESULTS OF THE CULTURE TO SOME OF THE NEW VARIETIES OF STRAWBERRIES, RECENTLY INTRODUCED INTO THIS COUNTRY; WITH THE METHOD ADOPTED.—BY THE HON. E. VOSE.

A good many persons having attempted the cultivation of the new large growing kinds of strawberries, with very various success, I will, agreeably to your request, state the results of my own experiments with some of them, and of which you have, I believe, seen specimens of the fruit, which have at different times been exhibited at the Horticultural Shows.

The Downton, or *Knight's Seedling*.—This variety, almost every one knows, was produced from seed, by the venerable Mr. Knight, President of the London Horticultural Society; and first introduced to notice in this country, I believe, by S. G. Perkins, Esq.

The soil upon which my strawberry plat is situated, is constituted of a light mellow loam, resting upon a sandy sub-soil; somewhat sheltered from the north-west. In the latter part of August, suitable preparation having been made, old rotten manure, to the depth of three inches, was turned in to the full depth of the spade; and the beds lined out, so as to leave the rows *twenty* inches asunder, and the plants *fourteen* inches from each other in the rows, placed in the quincuncial order. Before the severe frosts set in, they were covered slightly with leaves, and a little old manure thrown on top to prevent their being blown away. Scarcely a plant suffered through the winter, and the first year, the stools consisting of single plants, the quantity of fruit was small; many of the berries were, however, quite large, and of the coxcomb shape. The next season the stools had become well established; and in April the leaves and manure, with which they had been covered, were pointed in, and the beds dressed. When coming into bloom, and before the fruit had set, the spaces between the rows, and between the stools, were wholly covered with newly mowed grass, cut from the banks and the turf edges round the walks. This was used as a substitute for, and in preference to straw; it is more easily arranged about the stools; and it is readily obtained, as it is required about the period, when you wish to crop the banks the first time. "Grass cut from lawns," is recently recommended in Loudon's Magazine for the same purpose; although it is not many years since, that Sir Joseph Banks advised a return to the old practice of the use of straw, (from which this fruit has derived its name,) as preferable to the many contrivances of trenches between the rows, boards laid lengthwise, and tiles, which had been substituted for the same object.

As it is possible that every person who may be about planting a strawberry bed, may not be aware of the uses of the grass, I will allude to them. In the first place, it protects the plants against drought, by shading their roots from the sun's rays, and also by resisting the escape of the moisture, which would otherwise evaporate into the atmosphere. Of all the large sorts, the *scapes*, or stems, are too feeble to support the fruit, when ripe, in an upright position, consequently all that which grows on the outside of the stools falls into the soil, and is, of course, spoiled; heavy showers, too, beat up the soil over much of the fruit, and make it *gritty*. When the beds are dressed in the spring, it is desirable not to disturb them till the crop is gathered, and the grass serves to keep the weeds down. It is said also to prevent the attack of slugs, as they cannot pass over it.

This was properly the first bearing year, and nothing could look finer than the vines when in fruit; the crop was abundant; many of the berries were of the coxcomb form, and some of them assuming circular and fanciful shapes, with the *calyx* nearly invisible in the centre.

After the fruit season had passed, the grass was removed, and the vines were permitted to extend themselves, and such of the runners as had not been used, were dug in before covering in the autumn, so as to keep the stools entirely distinct.

The next year, the stools having increased in size, the quantity of fruit was greater in proportion; the berries, however, were much more generally conical in shape. The third season, which was the last, the product was fully equal to the previous one.

The flavor of this variety being equal to the smaller sorts, and the flesh finer and more delicate than any of larger ones, it is, on all accounts, entitled to a preference over any of the new varieties which I have cultivated.

It is important, however, with the Downton, in making a bed, that the runners be all taken from fruitful plants, bearing, as it does, its *staminate* and *pistillate* flowers on different roots; there is danger of obtaining some that are called *males*, which are entirely useless, and exhaust the soil to no purpose; and, as they are not weakened by the production of fruit, the runners extend themselves much more rapidly than the others. It is not long since, that, in England, it was thought necessary, in planting, to apportion *one* sterile to about *ten* fruitful plants; but this opinion is exploded, and now all but the fruitful ones are carefully avoided; nor is it necessary to wait for the flower to determine them; the difference is perceptible in the foliage, that of the sterile being much more rank and coarse.

Wilmot's Superb. This variety, which has excited so much admiration in Europe, treated in the same mode as the Downton, (I have, in fact, employed the same method with all the large sorts which I have attempted to cultivate,) was abandoned, after the second year; the product being so small as not to warrant farther trial.

Keen's Seedling. This has succeeded well; it is a good bearer, and of fine flavor; not quite equal to the *Downton* in either point; but its large, dark rich berries are altogether a beautiful fruit, and it well deserves cultivation.

The last season, an individual at East Cambridge produced an abundant crop, and larger fruit than I have ever before seen of this variety; whilst other persons, experienced cultivators too, have given up this, as well as the *Downton*, after a trial, for want of success. In the cases of failure, there seems, to have been one radical error; that is, the plants have been placed upon strong, rich garden soils, and often somewhat moist: whether such soils are too adhesive to permit the fibres sufficiently to extend themselves, or the nutriment which the plant absorbs, be unfit to form the basis of fruit, is a matter of mere theory, which is of no importance, so long as the facts which the results exhibit are before us, and which have been, as far as my own observations have extended to such situations, a profusion of foliage, but little or no fruit.

Methven Castle, or *Methven Scarlet*.—This strawberry, more hardy than any of the large kinds, is very prolific; but the fruit is somewhat spongy in the centre, and it has not the fine flavor of some other sorts; still the magnificent appearance of its enormously large globular berries, renders it a desirable object of cultivation to a certain extent. The question has often been agitated, as to the comparative merits of these new large varieties, with some of the older and smaller ones. With all the *smaller* fruits, size and appearance certainly weigh a great deal in the estimate of their value; and almost every cultivator would be desirous of growing a proportion of the fine large sorts; and, with proper management, they would unquestionably well repay him; still it is not to be denied that they require to be treated with a *good deal more care and attention* than the small ones to expect success. Of the latter kinds, I have made trial of several varieties, among which the

Early Virginia, or *Early Scarlet*, is a valuable one: it is of fine flavor, produces a fair crop, and, as it serves to lengthen out the season of this delicious fruit, it is well worthy of cultivation. It comes into bearing ten days earlier than any other variety.

Wood Strawberry. This old variety has excellent properties: if well cultivated, a greater crop may be obtained from the same space than of any other kind: the period of its ripening is of long duration: it may be cultivated with as little labor, and it will produce well for three successive years, on beds running into mats. With this, as with all other fruits, the red is of higher flavor than the white.

Alpine. This old variety may be managed very similarly to the *Wood*: it has been sometimes recommended to cultivate it by seed, as a preferable mode to using the runners, but it is believed without much reason. I once attempted it with the *White Alpine without runners*; the seed, thought to be very choice, was received from the Horticultural Society of Paris. The plants were brought forward in a frame, and at a proper period they were transplanted; the stools enlarge themselves by offsets, and, like all this variety, it continued bearing till into autumn. Its extremely long and slender fruit had nothing peculiar in its flavor, nor did it seem to be worthy of cultivation, farther than as a matter of variety.

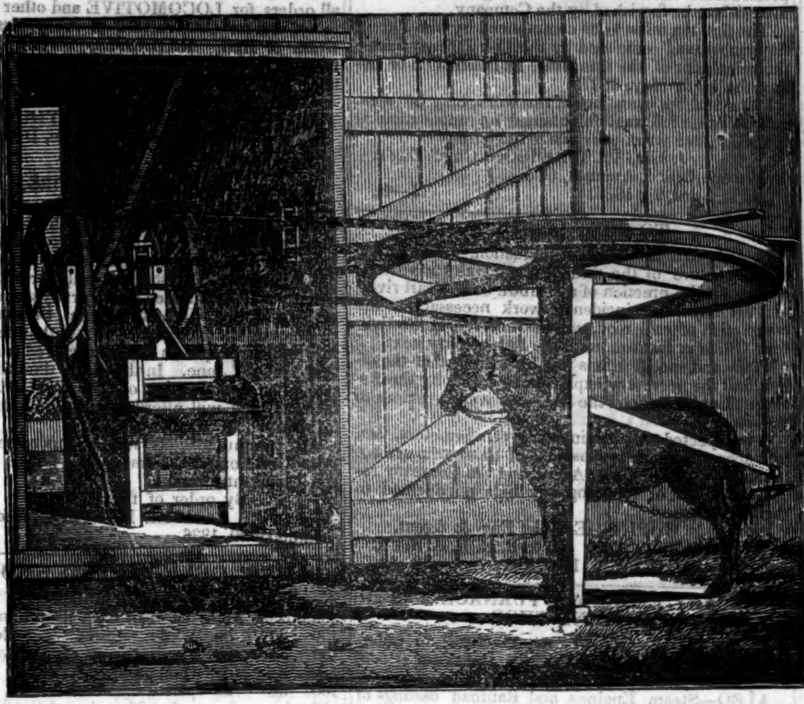
It is desirable, in a private garden, to make a new bed annually, which will enable the cultivator to turn in an old one at the same time, and still keep up a succession; as the strawberry is a great exhauster of the soil, the ground occupied by the old bed should be appropriated to some other crop.

Some distinguished cultivators have recommended burning the vines; in the spring they put on a covering of dry straw, an inch in thickness, and set on fire different portions of the same bed at three different periods. It is said to lengthen out the succession of the crop, and that the product is much larger. I have had no experience in this practice. The results of the exertions which have been made in this vicinity within a few years to improve the cultivation of this fruit, are very apparent, as seen in the increased quantities which the market of the metropolis affords, as well as in the introduction from England of those large and splendid varieties, which, till very recently, were unknown, even in that country; and when it is recollected that the English catalogues now contain over *one hundred* distinct varieties, and that they are constantly increasing, and that such are the facilities with which new and valuable fruits are now obtained from abroad, it may reasonably be expected that the number of choice varieties will not only be augmented, but that the period is not distant, when a fruit, which is as universally a favorite as it is simple and harmless in the use, will be produced in quantities more commensurate with the wants of the community.

E. VOSE.

Dorchester, Feb. 15, 1836.

THRESHING MACHINE AND HORSE POWER.

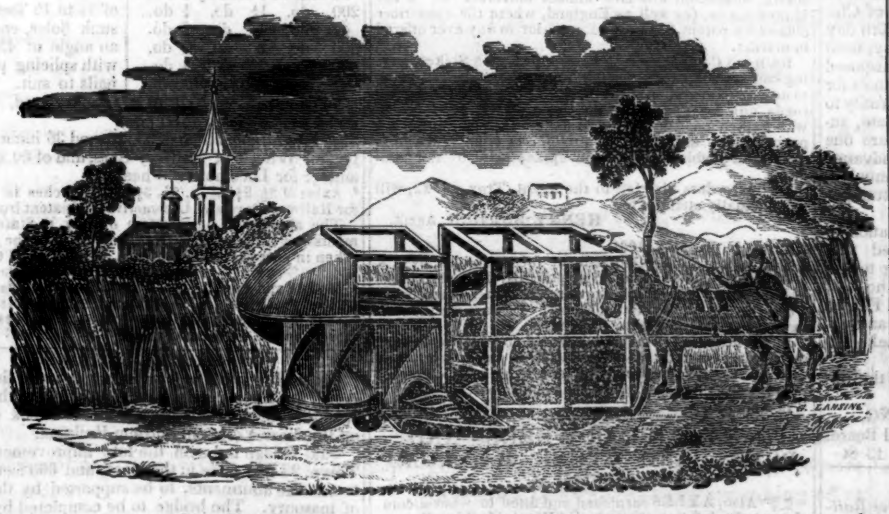


From the New-York Farmer.

The above engraving represents a threshing machine and horse power, invented by Mr. John Shaw, of Augusta, in the county of Kennebeck, and State of Maine, which, taking them on all accounts, are, perhaps, to be preferred to any other invention of the kind. They certainly appear to be less liable to disorder; the horse power embracing no complicated gearing, but doing the whole business with a strap and wheel; and the threshing part of the establishment is at least as simple and operative as any we have seen: and, what is a farther recommendation, we believe they cost less than any other in use.

A threshing machine, with a horse power to propel it, are a pretty heavy item of expense to the farmer, and those we have seen in operation are so liable to get disordered and become useless, and so absolutely unnecessary to the farmer's convenience, that we would advise any one who is about to purchase, to call and examine the above.—The whole concern is so simple, and so well represented by the above cut, that we deem any farther description unnecessary, especially as no one will probably atempt to construct without looking at the machines themselves. This apparatus may be seen and examined by calling on Mr. Barney, in Albany, who, we believe, is proprietor of the patent right for that vicinity.

MOWING AND GRAIN CUTTING MACHINE.



From the New-York Farmer.

A model of a machine for the above purpose was exhibited last fall, at the Fair of the Mechanics' Institute in this city, by the inventor, Capt. Alexander Wilson, of Rhinebec, from which model the above engraving was taken. It was pronounced by many, who, we have reason to suppose, were competent judges, to be superior to any other plan which has hitherto been exhibited, and Capt. W., who is himself a practical farmer, has tested it by sufficient experiments to give him perfect confidence in its success. He is now having the machines built for actual use, at the machine shop of Mr. Fuller, in Waterford, under the direction of Mr. Fairman, whose mechanical talents are not surpassed, to say the least, by those of any other man in this State. There is now building one calculated to cut twelve acres of grass or grain per day, and to be operated and managed by one horse and boy, without any other assistance. The grass will be spread by the machine, and the grain left in swarths for raking and binding.

There are many farmers who have a few acres of meadow so formed by nature as, perhaps, to render this machine forever useless on them; and there are others who cannot afford the time and labor to remove a few stones, and render their meadows smooth. Both these classes will probably condemn, or at least ridicule the use of a mowing machine. But there is a large number, and the proportion is rapidly increasing, who possess large tracts of ooth grass and grain land, who will decide very differently, and it is fortunate that this class of gentlemen possess not only the disposition but the means to encourage such an improvement. But though a large proportion of the lands east of the Alleghany, where this machine will be highly useful, still the maximum of its usefulness will be on the western prairies, where, with a strong team of two or more horses, it will prove the most efficient pioneer that ever smoothed the surface of a new country. We cannot but hope that an invention of so much promise will receive from the public a fair and candid trial, and the reward it merits.

ON THE COMPARATIVE VALUE OF IRISH AND VIRGINIAN TOBACCO. BY EDMUND DAVY, P. R. S., M. R. I. A., &C., PROFESSOR OF CHEMISTRY TO THE ROYAL DUBLIN SOCIETY.

In the year 1829–30, the cultivation of tobacco in Ireland excited much attention among agriculturists, and several hundred acres of it were raised in different counties; in consequence, the attention of the Royal Dublin Society was directed to the subject, and the author was requested by a select committee of that body to institute experiments on tobacco, with a view to determine some questions of a practical nature, as whether its root contained nicotin, and in what quantity, and to ascertain the comparative value of Irish and Virginian tobacco.

The author's experiments were made on average samples of Virginian and Irish tobacco; for the former he was indebted to the kindness of Mr. Simon Foot, and for the latter to Messrs. Wild, Cuthbert, Cathwell, and Brodigan. From a number of experiments, the author was led to conclude, that the dried roots of Irish tobacco contain from four to five parts of nicotin in 100 parts; and that one pound of good Virginian tobacco is equivalent in value to about twenty-four pounds of good Irish tobacco.

After the author had finished his experiments, it was gratifying to him to be informed that some manufacturers estimate one pound of Virginian tobacco equivalent in value to about two pounds of Irish. Hence there seems to be a pretty near coincidence between their results and those derived from a chemical examination.—[Proceedings of the British Association: Lond. and Edinb. Phil. Mag., vol. vii., p. 391.] A. T.

PROSPECTUS
OF VOL. II. OF THE
CHICAGO AMERICAN,
TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public. The reasons that induced him about a year since to establish his weekly paper, operate with renewed and increasing force in favor of his present design. He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wilderness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of his future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at $4 per annum, if paid at the time of subscribing; $5 if paid at the expiration of six months, or $6 if payment is delayed to the end of the year.

⁂ Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

⁂ All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

⁂ Subscriptions and advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, No. 132 Nassau street, by

D. K. MINOR.

CHICAGO LOTS.

Notice is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section Number Fifteen, in the Township Number Thirty-Nine, North of Range Fourteen, East of the third principal Meridian, adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harbor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,
Treasurer to said Board.

Chicago, March 17, 1836. 13–8t

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroad.

No. 264 Elizabeth street, near Bleecker street,
New-York.

☞ RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlem Railroad now in operation. J25tf

GEORGIA RAILROAD & BANKING COMPANY.
NOTICE TO CONTRACTORS.

SEALED Proposals will be received at this office, between the 1st and 3d of June next, for laying the superstructure on 50 miles of the Georgia Railroad—all materials to be furnished by the Company.

The first ten miles to be commenced by the 10th of September, and completed by the 15th January next—the remainder of the line MUST BE finished on or before the 1st of May, 1837.

Plans and Specifications of the work, may be seen, and all other information obtained on application at the office, one week previous to the letting.

J. EDGAR THOMSON, Chief Eng'r.

Engineer's Office, Augusta, Geo.
April, 2d, 1836. 12—4t.

TO CONTRACTORS.

Sealed proposals for the graduation, bridging and superstructure of the JACKSON and BRANDON RAILROAD: for the erection of a BRIDGE over Pearl river, and the remaining incidental work necessary to the completion of said road, will be received at the Railroad Office in Jackson, until the 10th of May next.

Plans and specifications will be exhibited at the office, and the necessary explanations given, by the Assistant Engineer upon the line, one week previous to the letting.

It is expected that testimonials of characters, &c. will accompany the propositions of those who are not personally known to the Agent, and the Company reserve the right of rejecting any bids not deemed to their advantage.

W. PETRIE, Chief Eng. & Agent.
J. & B. R. R. & B. Co.

Jackson, Mi. March 15, 1836. 12—3t.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9-1y

NOTICE TO CONTRACTORS FOR EXCAVATION AND EMBANKMENT.

Proposals will be received at the Office of the Munroe Railroad Company, Macon, Geo., between the 19th and 21st of May next, for Excavating and Embanking the whole of the Railroad from Macon to Forsyth, a distance of 25 miles, embracing much heavy graduation.

For further information, apply to

DANIEL GRIFFIN,
Resident Engineer.
J. EDGAR THOMSON,
C. Engineer.

Macon, March 28th, 1836. 11—5t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

☞ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

☞ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

☞ Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM, & GROSVENOR.

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron. RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
Superintendent, at Newcastle, Delaware.

feb 20—ytf

TO CONTRACTORS.

NOTICE is hereby given to all persons who may feel disposed to take Contracts on the Illinois and Michigan Canal, that the Board of Commissioners have determined to commence that work as early in the spring as circumstances will permit. The Engineers will commence their surveys about the 10th of March, and will have several Sections ready for contract by the first of May. It is therefore expected that definite proposals will be received from that date to the first of June. In the mean time the Board invite an early inspection of that part of the route to Chicago, and will afford any information that may be required of them.

All communications will be addressed to "The Board of Commissioners of the Illinois and Michigan Canal, at Chicago."

By order of the Board.
JOEL MANNING, Secretary.

January 20, 1836. 8-6t

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior back-strap Shovels			
150	do	do	do	plain do
150	do	do	do	cast steel Shovels & Spades
150	do	do	Gold-mining Shovels	
100	do	do	plated Spades	
50	do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined Iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

ARCHIMEDES WORKS.
(100 North Moor st. N. Y.)

NEW YORK, February 12th, 1836.

The undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

RAILWAY IRON.

95 tons of 1 inch by $\frac{1}{2}$ inch,
200 do. $1\frac{1}{4}$ do. $\frac{1}{2}$ do.
40 do. $1\frac{1}{2}$ do. $\frac{3}{8}$ do.
800 do. 2 do. $\frac{1}{2}$ do.
800 do. $2\frac{1}{4}$ do. $\frac{5}{8}$ do.
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of $2\frac{1}{2}$, $2\frac{3}{4}$, $2\frac{7}{8}$, 3, $3\frac{1}{8}$, $3\frac{1}{4}$ and $3\frac{1}{2}$ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them. 4—d7 1meowr

TO BRIDGE BUILDERS.

Sealed Proposals will be received, until the 15th of April, for finding materials and building the superstructure of a bridge, over Harlem Creek and flats, on the New York and Harlem Railroad.

Said Bridge to be on the late improvement of Mr. Town, 24 feet wide in the clear, and 660 feet long between the abutments, to be supported by three piers of masonry. The bridge to be completed by the 1st of Nov. ensuing. Communications may be addressed to the undersigned, at his office, No. 9 Chambers street, where plans and specifications may be seen.

JOHN EWEN, JR.
Engineer of the New York and Harlem Railroad.

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